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G. A. Miller Jr.

SCIENTIFIC RESULTS  
OF  
THE SECOND YARKAND MISSION;

BASED UPON THE COLLECTIONS AND NOTES

OF THE LATE

FERDINAND STOLICKZA, PH.D.

MAMMALIA,

BY

W. T. BLANFORD, F. R. S.

(CHIROPTERA BY G. E. DOBSON, M. A., M. B.)

Published by order of the Government of India.

CALCUTTA:

OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.  
1879.



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SCIENTIFIC RESULTS  
OF  
THE SECOND YARKAND MISSION.

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MAMMALIA.

By W. T. BLANFORD.

THE following notes upon the specimens of mammalia collected by the late Dr. Stoliczka when accompanying the mission sent by the Government of India in 1873-74 to Káshghar<sup>1</sup> must be considered as only a contribution to the zoology of the countries traversed. Some additions have been made from the collections obtained by Dr. Henderson, who accompanied a former mission to Yárdak, and by Dr. J. Scully, who visited Eastern Turkestan as Medical Officer with Mr. R. B. Shaw, the Political Agent, despatched by the Government of India in 1874-75 to visit the Amir of Káshghar. It is, however, impossible to give anything like a complete list of the mammalia inhabiting Eastern Turkestan, the Pámir, and Wakhán. Even of Ladák, which is easy of access, and yearly traversed by English sportsmen and travellers, although the larger animals are known, much additional information will probably be necessary before we obtain a complete acquaintance with the smaller forms. The fact that, amongst the mammals collected in Ladák by Dr. Stoliczka, four (a shrew, a vole, a mouse, and a *Lagomys*) were previously unknown, and two others incorrectly identified, renders it probable that several more remain to be determined. The works of previous travellers give but imperfect information on the zoology of Ladák; and Dr. Stoliczka, in former years, proposed to write a general work on the animals and plants of Western Tibet, an intention which unfortunately he did not live to carry out. The present writer lies under the disadvantage of being unacquainted with the country; and it is almost impossible to do justice to the important questions of distribution and range without having visited the region inhabited by the fauna described.

<sup>1</sup> The practice of using the name of 'Yárdak,' which really applies only to a city, for the whole of Eastern Turkestan, although quite erroneous, has become too common amongst English writers, and in official reports, to be easily superseded. An attempt has been made to substitute the term 'Káshgharia,' but it has not been successful. The proper name of the region comprising the cities of Káshghar, Yárdak, Khoten, Aksu, &c., is Eastern Turkestan; and as the country has now once more fallen into the hands of the Chinese, the old term 'Chinese Turkestan' is again applicable. It is to be regretted that the name 'Yárdak Mission' tends to support a geographical error. The spelling of 'Káshghar' is doubtful; it is sometimes spelt 'Káshkar' or 'Káshqar.'

## SECOND YARKAND MISSION.

The districts traversed by the Yárkand Mission,<sup>1</sup> although all, with the exception of Kashmir, where a mixture of Indian (Oriental) forms is found, within the limits of the Palæoarctic region, still belong to different sub-provinces, distinguished chiefly by their physical characters, and especially by their elevation. Western Tibet or Ladák, in which may be included all the area north of Kashmir drained by the Indus and its tributaries, is a part of the high barren Tibetan plateau, and the fauna comprises typically Alpine forms, such as wild sheep and ibex, marmots, and *Lagomys*. The fauna inhabiting the ranges commonly known as the Kuenlun, intervening between the northern watershed of the Indus and the low plains of Turkestan, is very similar to that of Tibet proper, but several species appear different. The animals of the plains of Eastern Turkestan around Yárkand and Káshghar belong to very distinct types, and appertain to the desert fauna of Central Asia, characterized especially by the abundance of rodents, such as *Gerbillus*, *Cricetus*, and *Dipus*. The few specimens of the mammals inhabiting the Thian Shan range, Pámir, and Wakhán contained in Dr. Stoliczka's collection are insufficient to give much idea of the fauna, as they were collected under great difficulties, during journeys when the ground was for the most part covered with deep snow. The fauna of each of the zoological sub-provinces traversed will, however, need a few remarks: these sub-provinces are—

- I.—Kashmir and the Punjab hills.
- II.—Western Tibet, or Ladák.
- III.—Kuenlun.
- IV.—Plains of Eastern Turkestan.
- V.—Ranges west and north of Yárkand and Káshghar, including Sarikol, the Pámir, Wakhán, and the Thian Shan.

The last should very possibly be subdivided. It is certain that the wild sheep and hare of the Pámir differ from those of the mountains north of Káshghar, and many of the species of mammals inhabiting the mountain ranges of Central Asia appear to have a restricted range.

Eastern Turkestan has been visited, in modern times by but few European travellers. The most important of these, apart from the members of the two missions under Sir Douglas

<sup>1</sup> The route followed is described in detail in the official "Report of a Mission to Yárkand in 1873 under command of Sir T. D. Forsyth, K. C. S. I., C. B.," Calcutta, 1875; and represented on a map published with the report and compiled by Captain H. Trotter, R.E., of the Great Trigonometrical Survey of India, one of the officers attached to the Mission. An account of the journey, and many observations on the fauna, will also be given in Dr. Stoliczka's diary, to be published uniformly with the present and other scientific results.

Briefly, the following was the line of march. Starting from Murree (Mari) in the Punjab hills, on the 15th July 1873, the party of the Mission to which Dr. Stoliczka was attached proceeded to Srinagar in Kashmir, and thence across the Zoji-la, and by Drás, Kárgil, Lamayuru, and Snurla to Leh, in Ladák, where they arrived on the 27th August. After a halt of about a fortnight, the journey was continued over the Chang or Sakti pass to Lukong on the Pankong lake. Thus far the direction followed from Murree had been, on the whole, very nearly due east, but from the Pankong the route lay north or north-west to Káshghar. From Lukong, Dr. Stoliczka marched by Changchenmo, and the high plain of Lingzi Thung, to the head of the Yárkand river at Aktágh, and thence by the Suget Pass across the main Kuenlun axis to Shahidúla on the Kárákásh river, and again over the Sánju or Grim pass to Sánju on the edge of the plain of Eastern Turkestan. Continuing the journey, the Mission party arrived at Yárkand on the 8th November, and at Káshghar on the 4th December. From Káshghar, two excursions were made; one to the north by west, as far as the Chadyr lake, just inside the Russian frontier; the other to the north-east as far as the Belowti pass on the road to Ush Turfán. Dr. Stoliczka was then attached to the party under Colonel Gordon; and, leaving Káshghar on the 17th March 1874, proceeded south-west via Sarikol to the Pámir plateau, and as far as Panjah in Wakhán, where he arrived on the 18th April, and remained a fortnight, returning to Yárkand by the same route, with the exception of a detour on the Pámir. Yárkand was reached on the 21st May, and quitted again on the 28th, whence the Mission party proceeded to recross the Kuenlun by a more western route than before, over the Yangi Diwán, and then took the Kárákoram and Sháyok route to Leh. Dr. Stoliczka died at Murghi, two marches south of the Kárákoram, on the 19th June 1874.

Forsyth, are Messrs. Shaw and Hayward, who, independently of each other, penetrated to Káshghar in 1868; Dr. Scully, who accompanied Mr. Shaw to Káshghar, when the last named officer visited the country a second time in 1874; and Colonel Prejevalski, whose journeys, however, were entirely to the eastward of Káshghar and Yárkand. Excellent accounts have been published of most of the visits.<sup>1</sup> Occasional references to the fauna may be found in all of them, but the only travellers, except Dr. Stoliczka, who paid special attention to the zoology of the country, were Dr. Henderson, who was attached as medical officer to the first mission under Sir Douglas Forsyth, Dr. Scully, who accompanied Mr. Shaw in a similar capacity, and Colonel Prejevalski. The detailed zoological results of Colonel Prejevalski's journey to Lake Lob and the Altyn mountains in Eastern Turkestan, if published, have not yet reached India, but lists of the larger mammals noticed are given in the official report of his journey, which has been translated into German and English.<sup>2</sup> In these notices, however, the species are naturally not critically determined. Both Dr. Henderson and Dr. Scully paid especial attention to birds, although both brought away with them some very interesting mammals. Some of the rodents procured by Dr. Henderson were described by Dr. J. Anderson in the Proceedings of the Zoological Society of London,<sup>3</sup> and notices of some specimens obtained by Dr. Scully were given by Mr. Wood-Mason<sup>4</sup> and the present writer<sup>5</sup> in the Journal and Proceedings of the Asiatic Society of Bengal. The specimens thus described, and a few others not hitherto mentioned in print, will be noticed in the following pages. It is a singular fact, showing how much, in all probability, yet remains to be ascertained concerning the fauna of Ladák and Yárkand, that of the seven species of mammals<sup>6</sup> of which specimens were procured in those countries by Dr. Henderson, only three are represented in the collections made by Dr. Stoliczka.

Although Ladák has been visited and described by numerous travellers, there is not much more recorded concerning its fauna than is to be found in occasional notes. Very little indeed can be gleaned from Moorcroft.<sup>7</sup> Vigne<sup>8</sup> noticed a few of the mammals met with, and one of the wild sheep has been named after him. Thomson<sup>9</sup> devoted himself solely to botany, and scarcely referred to any of the animals observed; but Cunningham<sup>10</sup> gave a chapter to the wild animals of Ladák, amongst which he mentioned the kyang, wild yak, three kinds of wild sheep, markhor, ibex, Tibetan stag, musk deer, leopard, bear, wolf, fox, hare, lagomys, marmot, and weasel. Some of these animals cannot, however, be

<sup>1</sup> Visit to High Tartary, Yárkand and Kashghar, formerly Chinese Tartary, and return journey over the Karakoram Pass. By Robert Shaw: London, 1871.

Journey from Leh to Yárkand and Kashghar, and exploration of the sources of the Yárkand river. By G. W. Hayward; Jour. Roy. Geog. Soc., 1870, xl, p. 33.

Lahore to Yárkand. By George Henderson, M. D., and Allan O. Hume, c. b. : London, 1873.

A contribution to the Ornithology of Eastern Turkestan. By J. Scully, Surgeon, Bengal Army. Stray Feathers, iv, 1876, p. 41.

<sup>2</sup> Przewalsky's Reise an den Lob-nor und Altyn-Tag, 1876-77; Petermann's Mittheilungen, Ergänzungsheft No. 53, 1878.—From Kulja across the Tian-Shan to Lob-nor by Colonel N. Prejevalsky; translated by E. Delmar Morgan: London, 1879.

<sup>3</sup> On some Rodents from Yárkand, P. Z. S., 1871, p. 559.

<sup>4</sup> P. A. S. B., 1876, p. 80.

<sup>5</sup> J. A. S. B., 1876, xlv, Pt. 2, p. 49; 1877, xlvi, Pt. 2, p. 259.

<sup>6</sup> These species were *Erinaceus albulus*, *Mustela temon* ?, *M. erminea*, *Arctomys himalayanus*, *A. caudatus*, *Lepus pallipes* var., and *Lagomys ladacensis*. The first and the two last were obtained also by Dr. Stoliczka.

<sup>7</sup> Travels in the Himalayan Provinces of Hindustan and the Punjab, in Ladakh and Kashmir, &c., 1841, p. 311.

<sup>8</sup> Travels in Kashmir, Ladak, Iskardo, &c., 1842, ii, p. 277, &c.

<sup>9</sup> Western Himalaya and Tibet, 1852.

<sup>10</sup> Ladak, physical, statistical, and historical, with notices of the surrounding countries: London, 1854, p. 195.

## SECOND YARKAND MISSION.

said to inhabit Ladák; they are found in other parts of Tibet or in Kashmir, and the list even of the larger mammals is incomplete, as neither of the two kinds of antelope is included.

Dr. Leith Adams,<sup>1</sup> in his "Remarks on the Habits and Haunts of some of the Mammalia found in various parts of India and the West Himalayan Mountains," gives many details concerning the animals of Ladák. The scientific names, taken from the British Museum, are, however, often different from those used by naturalists at the present day. In his "Wanderings of a Naturalist in India,"<sup>2</sup> the same author describes his visit to Ladák, and notices the principal mammals observed during his journey, with many notes of interest concerning their distribution and habits. Heads of several of the larger mammalia of Ladák are well photographed in Kinloch's "Large Game Shooting in Thibet, &c."<sup>3</sup>

Kashmir proper, or the valley of the Upper Jhelum, is the only part of the country traversed by Dr. Stoliczka that is included in the area of which the fauna was described in Jerdon's "Mammals of India."<sup>4</sup> It is but very rarely that a reference to the mammals of Western Tibet is to be found in Mr Blyth's writings, although he procured many animals from the eastern part of that country.

The only writer, previous to Dr. Jerdon, who gave any general account of the Kashmir mammals was Dr. A. Wagner, who compiled a list mainly from the notes and collections of Freiherr von Hügel. This account was published as one of the appendices<sup>5</sup> to Von Hügel's "Kaschmir und das Reich der Siek."

In Dr. Falconer's "Palaeontological Memoirs"<sup>6</sup> there are a few notes, written many years previously, on some of the animals of Kashmir and Ladák. Good descriptions of the stag, musk deer, ibex, marten, Tibetan hare, and marmot are given; but the names proposed had been preceded by others before the notes in question were published, and the only new term which has been adopted is that for the Kashmir stag, separately published by its proposer.

From the data already noticed, and some notes supplied by Mr. Shaw, Dr. Scully, Captain Trotter, Captain Biddulph, Dr. Cayley and others, the following lists are compiled.

1. **Kashmir.**—The area comprises the whole of the Upper Jhelum drainage, from the Pir Panjál range on the south to the Zánskár range, forming the watershed between Kashmir proper and Ladák (Drás, Zánskár, &c.) on the north. In the following list the animals observed by Von Hügel, Jerdon, and others are included.<sup>7</sup> The list of the larger animals is probably complete, or nearly so. An Indian or Tibetan form may occasionally stray across the mountains, but the species inhabiting the valley and the mountains around are for the most part well known. Of the smaller animals, however, much additional information is desirable. Considering how many English resort annually to Kashmir, it is surprising that our knowledge of the fauna is not more accurate.

## CHIROPTERA.

*Megaderma lyra.*  
*Vespertilio longipes.*

*Vesperugo serotinus.*  
*V. pipistrellus.*

<sup>1</sup> P. Z. S., 1858, p. 512.

<sup>2</sup> Edinburgh, 1867.

<sup>3</sup> London, 1869, 2nd series, 1876.

<sup>4</sup> Roorkee, 1867.

<sup>5</sup> Vol. iv, pt. 2, 1844, pp. 567-581.

<sup>6</sup> London, 1868, Vol. i, pp. 576-586.

<sup>7</sup> I am indebted to Mr. Lydekker for assistance in drawing up this list.

## INSECTIVORA.

*Sorex (Pachyura) sp.*

## CARNIVORA.

<i>Felis pardus.</i>	<i>Canis (Vulpes) montanus.</i>
<i>F. (a small species, perhaps <i>F. bengalensis</i>).</i>	<i>Mustela subhemachelana.</i>
<i>Herpestes nipalensis.</i>	<i>Martes flavigula.</i>
<i>H. griseus.</i>	<i>Lutra, sp.</i>
<i>Canis aureus.</i>	<i>Ursus isabellinus.</i>
<i>C. (Cuon) rutilans?</i>	<i>U. torquatus (U. tibetanus).</i>

## RODENTIA.

<i>Pteromys inornatus.</i>	<i>Mus homourus.</i>
<i>Sciuropterus fimbriatus.</i>	<i>Arvicola roylei.</i>
<i>Nesokia barclayana.</i>	<i>Lagomys roylei.</i>
<i>Mus bactrianus (M. theobaldi).</i>	

## UNGULATA.

<i>Sus, sp.</i>	<i>Nemorhedus bubalinus.</i>
<i>Capra sibirica.</i>	<i>N. goral.</i>
<i>C. falconeri (C. megaceros).</i>	<i>Moschus moschiferus.</i>
<i>Hemitragus jemlaicus.</i>	<i>Cervus cashmirianus.</i>

*Arctomys caudatus* is found on the Kashmir side of the Zánskár range, and *Lepus ruficaudatus* is said to have occurred north of the Pir Panjál, but neither can be fairly included in the Kashmir fauna. *Capra sibirica*, too, is confined to the ranges north of the valley.

The fauna, it will be seen, is Himalayan, with an admixture of palæarctic and of a few truly Indian species, such as *Herpestes griseus*.

**II. Western Tibet, or Ladak.**—This includes the valley of the Upper Indus east of Skardo, so far as the country belongs to Kashmir. It is an open question whether the fauna of Gilgit should be included in that of Western Tibet. There are several differences, and the occurrence of two species of *Cricetus*<sup>1</sup> in Gilgit shews a much closer connexion with the Central Asiatic fauna of Turkestan than is exhibited by the types of the Upper Indus valley. It appears, on the whole, best to omit the Gilgit forms, and with them to exclude *Capra falconeri*, an Afghan and Pir Panjál goat found in Gilgit and Skardo. With these omissions, the following is the list of mammals known to exist in Ladák<sup>2</sup>:

## CHIROPTERA.

*Plecotus auritus.*

## INSECTIVORA.

*Sorex (Crocidura) myoides.*

## CARNIVORA.

<i>Felis uncia.</i>	<i>Canis (Cuon) alpinus.</i>
<i>F. isabellina.</i>	<i>C. (Vulpes) flavescens.</i>
<i>Canis laniiger.</i>	<i>Mustela erminea.</i>
<i>C. niger</i> <sup>3</sup> (perhaps only a melanoid variety of the preceding).	<i>M. sp. (a small species of a brown colour).</i>
	<i>Lutra, sp.</i>

<sup>1</sup> Recently procured by Captain Biddulph.

<sup>2</sup> I am indebted to Dr. H. Cayley, who was for a long time British Resident in Ladák, for corrections in the following list, and for some additions to it. *Martes toufæa* should probably be added, see p. 30.

<sup>3</sup> P. Z. S., 1874, p. 654, pl. LXXVIII.

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## RODENTIA.

*Arctomys caudatus.*  
*A. himalayanus.*  
*Mus sublimis.*  
*Arvicola blythi.*

*Arvicola stoliczkanus.*  
*Lepus tibetanus.*  
*L. hypsibius.*  
*Lagomys ladacensis.*

*Lagomys auritus.*

## UNGULATA.

*Equus hemionus.*  
*Bos grunniens.*  
*Ovis hodgsoni, (O. ammon, auct., nec Linn.)*  
*O. vignei.*<sup>1</sup>

*Ovis nahura.*  
*Capra sibirica.*  
*Pantholops hodgsoni.*  
*Gazella picticaudata.*

The isabelline bear, stag, and a few other animals, which inhabit Kashmir, occasionally cross the mountains into Ladák, and may be found in Drás and Zánskár, but they are not permanent inhabitants of the Tibetan region, and cannot be included in the fauna. The musk deer may be Tibetan, and Mr. Lydekker<sup>2</sup> is inclined to think it is so, as he has seen skins said to have been procured in Ladák, and the animal has a Tibetan name; but I have been unable to find that any one has actually seen the species wild in Tibet.

For comparison with the Western Tibetan fauna, the following list of the mammals, hitherto recorded as found in Eastern Tibet,<sup>3</sup> may be useful. I carefully exclude the numerous species mentioned by Hodgson, Blyth, and Père David, which are palpably forest forms, inhabiting comparatively low elevations (below 10,000 feet above the sea). These species come from the portions of Eastern Tibet which are south of the main Himalayan range, and which enjoy a damp climate.

## CARNIVORA.

*Felis uncia.*  
*F. manul.*  
*F. isabellina.*  
*Canis laniger.*  
*C. (Cuon) alpinus.*  
*C. (Vulpes) flavescens.*

*Canis (Vulpes) ferrilatus.*  
*Martes touzæa.*  
*Mustela erminea.*  
*M. temon.*  
*Putorius larvatus, (P. eversmanni, teste Gray).*  
*Ursus pruinosus.*

## RODENTIA.

*Arctomys himalayanus, (A. robustus).*  
*Sciurus europæus?*  
*Lepus pallipes.*

*Lepus oiolostolus* (perhaps the same as *L. pallipes*).  
*Lagomys curzonæ.*  
*L. tibetanus* (perhaps the same as the last).

## UNGULATA.

*Equus hemionus.*  
*Bos grunniens.*  
*Ovis hodgsoni.*

*O. nahura.*  
*Capra sibirica.*  
*Pantholops hodgsoni.*

*Gazella picticaudata.*

Perhaps *Budorcas taxicolor*, *Moschus moschiferus*, and *Cervus affinis* should be added, but I have grave doubts whether any of them are found on the Tibetan plateau.

<sup>1</sup> Another large sheep, *O. brookei*, described P. Z. S., 1874, p. 143, is founded on a skull supposed by its describer, Mr. E. Ward, to have been brought from Leh in Ladák; but no additional specimens have been obtained to confirm the locality.

<sup>2</sup> J. A. S. B., 1877, xlvi, Pt. 2, p. 288.

<sup>3</sup> My principal authorities for this list are Blyth's Catalogue of Mammals in the Museum, Asiatic Society; Jerdon's Mammals of India; the Catalogues of Hodgson's Mammals presented to the British Museum; and Père David's List of Eastern Tibetan and Chinese Mammalia in the Nouvelles Archives du Muséum, Vol. vii, Bulletin p. 91. For some remarks on these authorities and on the Tibetan mammalian fauna, see P. Z. S., 1876, p. 631.

**III.—Kuenlun.**—From the Kuenlun ranges, including all the mountainous region north of the Kárákoram pass and Upper Yárkand river, and intervening between the Mastágh range (usually marked on maps as the Kárákoram range) and the plains of Yárkand, I find only the following species recorded<sup>1</sup> :—

<i>Mustela temon</i> ?	<i>Lagomys macrotis</i> .
<i>Arctomys himalayanus</i> .	<i>Equus hemionus</i> .
<i>Arvicola stoliczkanus</i> .	<i>Bos (Poephagus) grunniens</i> .
<i>Nesokia scullyi</i> .	<i>Ovis nahura</i> .
<i>Lepus pallipes</i> ? var.	<i>Capra sibirica</i> .
<i>Lagomys griseus</i> .	<i>Pantholops hodgsoni</i> .

On the Altyn-tagh, a lofty range of mountains discovered by Colonel Prejevalski just south of Lob-nor, but believed to be continuous with the Kuenlun ranges, the following animals were observed by that traveller. (Petermann's Mitth. Erghft., No. 53, p. 17; From Kulja, &c., p. 84.) The names are those given by Colonel Prejevalski, except those between parentheses :—

<i>Felis irbis</i> ( <i>F. uncia</i> ), very rare.	<i>Camelus bactrianus, ferus</i> , roaming about, rarely inside the mountains.
<i>Mustela intermedia</i> (? <i>Martes leucolachnæa</i> ), rare.	<i>Ovis polii</i> , rare.
<i>Canis lupus</i>	<i>Pseudois nahoor</i> ( <i>Ovis nahura</i> ) common.
<i>Canis chanko</i> ?	<i>Poëphagus grunniens, ferus</i> , rare.
<i>Canis vulpes</i> (? <i>V. flavescens</i> )	<i>Asinus kiang</i> ( <i>Equus hemionus</i> ), rare.
<i>Lepus</i> sp. (? <i>L. pallipes</i> ), common in ravines.	<i>Sus scrofa, ferus</i> , rare, in the ravines.
<i>Meriones</i> sp. (? <i>Gerbillus cryptorhinus</i> ), rare, in the ravines.	

**IV.—Eastern Turkestan.**—The following is the list of animals known to be found in the plains of Yárkand and Káshghar :—

## CHIROPTERA.

<i>Vesperugo pipistrellus</i> .	<i>Vesperugo discolor</i> .
<i>V. borealis</i> .	<i>Synotus darjilingensis</i> .

## INSECTIVORA.

*Erinaceus albulus*.

## CARNIVORA.

<i>Felis tigris</i> .	<i>Canis lupus</i> .
<i>F. shawiana</i> .	<i>C. (Vulpes) flavescens</i> .
<i>F. catus</i> , var.	<i>Mustela stoliczkanus</i> .

## RODENTIA.

<i>Cricetus (Cricetulus) fulvus</i> .	<i>Gerbillus cryptorhinus</i> .
<i>Mus pachycercus</i> .	<i>Dipus lagopus</i> .
<i>Mus erythronotus</i> .	<i>Lepus yarkandensis</i> .

## UNGULATA.

<i>Equus hemionus</i> ?	<i>Gazella subgutturosa</i> , var. <i>yarkandensis</i> .
<i>Sus scrofa</i> ?	<i>Cervus</i> , sp. ?

<sup>1</sup> I include animals observed in the valley of the Kárákásh and that of the upper portion of the Yárkand river. My authorities are Shaw, Hayward, and Henderson, besides Dr. Stoliczka's notes and collections.

That this list is very imperfect is unquestionable, and it is probable that many species remain to be added. It is not likely that the skins purchased in the bazaars of Yárkand and Káshghar came from other countries; but as it is uncertain whether they were obtained in the plains or amongst the mountains, their names are not included in either list, unless other evidence of the habitat is forthcoming. The following species are thus represented by skins or horns purchased in the towns mentioned:—

<i>Felis lynx.</i>	<i>Martes leucolachnæa.</i>
<i>Canis</i> , sp., indet.	<i>Meles</i> , sp., nov.
<i>C. (Vulpes)</i> , sp., indet.	<i>Capreolus pygargus.</i>

Wild camels are also found in the deserts east of Káshghar near Lob Nor. The occurrence of these animals was mentioned by Shaw (High Tartary, &c., p. 168), Hayward (J. R. G. S., 1870, xl, p. 134), Prejevalski (Petermann, Mittheilungen, 1874, p. 42), and others; and specimens have recently been obtained by the last-named traveller. The animal is said to be a small form of the two-humped or Bactrian camel, *Camelus bactrianus*; but there are doubts whether the animals found in the Turkestan desert are aboriginally wild, or merely the feral descendants of tame animals, abandoned or lost in the desert.

The following were the mammals observed by Colonel Prejevalski<sup>1</sup> around Lob-nor, and on the lower Tarim, the river formed by the junction of the Yárkand and other streams of Eastern Turkestan. The names in parentheses are those used in the present work:—

<i>Tigris regalis</i> ( <i>Felis tigris</i> ), common, locally abundant.	<i>Lepus</i> sp. (? <i>L. yarkandensis</i> ), tolerably common.
<i>Felis manul</i> , common.	<i>Meriones</i> sp. (? <i>Gerbillus cryptorhinus</i> ), locally common.
<i>Felis lynx</i> , said to be rare.	<i>Mus</i> sp. (? <i>M. pachycercus</i> ), not common.
<i>Canis lupus</i> , rare.	<i>Camelus bactrianus</i> , <i>ferus</i> , to the east of Lob-nor, rare in the sandy deserts on the Lower Tarim.
<i>Canis vulpes</i> (? <i>Vulpes flavescens</i> ), rare.	<i>Cervus maral</i> (? <i>C. affinis</i> ), common.
<i>Lutra vulgaris</i> , said to be tolerably common in lakes abounding in fish.	<i>Antilope subgutturosa</i> ( <i>Gazella subgutturosa</i> ), common.
<i>Erinaceus auritus</i> ? ( <i>E. albulus</i> ) rare.	<i>Sus scrofa</i> , <i>ferus</i> , common, locally abundant.
<i>Sorex</i> sp., rare.	

The fauna of Western Turkestan, now a province of the Russian Empire, has been described by Dr. N. A. Severtzoff in an elaborate paper published in Volume VIII of the "Transactions of the Imperial Society of Naturalists of Moscow," and also issued as a separate work under the title of "Verticalnoe e Gorozontalnoe Raspredalenie Turkestanskie Jevotnie."<sup>2</sup> This work is unfortunately written in Russian, but a translation into English of all the portions relating to the mammalia has been published by Mr. Carl Craemers in the Annals and Magazine of Natural History for 1876.<sup>3</sup> To this work it will frequently be necessary to allude in the following pages. In all, 83 species are enumerated. Of these, 11 are domesticated, and the remaining 72 belong to the following orders:—

<i>Chiroptera</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
<i>Insectivora</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
<i>Carnivora</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21
<i>Rodentia</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27
<i>Ungulata</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	14

<sup>1</sup> Petermann's Mittheilungen, Ergänzungsheft, No. 53, p. 9.—From Kulja across the Thian Shan, &c., p. 166.

<sup>2</sup> Moscow, 1873. When the present paper was first written, no translation of this work had appeared; and I am indebted to Dr. Feistmantel for very kindly translating some of the descriptions for me.

<sup>3</sup> Ser. 4, Vol. xviii, pp. 40, 168, 208, 225, 377. Some foot-notes by Mr. Alston are added.

Many details of the horizontal and vertical distribution are given, the whole area being divided into four districts,<sup>1</sup> and also into five vertical zones.

It is useless to copy out the list given by Severtzoff, because it is certain that many of the names require alteration. Thus Dobson has shown<sup>2</sup> that the seven bats, in all probability, represent but four species, and that several of the specific identifications are extremely doubtful. The nomenclature of the birds, which are much more easily determined than mammals, has been found to require alteration in many cases.

A list of the mammalia observed in China north of the Yang-tsi-kiang is furnished by Père Armand David in the "Nouvelles Archives du Muséum" for 1871, Vol. VII, Bulletin, p. 91. The country is considerably to the eastward of Turkestan, but there is a great similarity between the faunæ of the two regions. The identifications in Père David's list are by Mons. Alphonse Milne-Edwards, one of the best living authorities. The species believed to be new are figured by MM. H. and A. Milne-Edwards in their "Recherches pour servir à l'histoire naturelle des Mammifères." Apparently but few of the species of Northern China are the same as those of Eastern Turkestan.

**V.—Ranges west and north of Yarkand and Kashghar.**—The following mammals were observed or collected on the ranges west of Yarkand, including the Pámir plateau—

<i>Felis uncia.</i>	<i>Cricetus (Cricetulus) phœnus.</i>
<i>Ursus</i> , sp.	<i>C. (Cricetulus) fulvus.</i>
<i>Canis lupus.</i>	<i>Lepus pamirensis.</i>
<i>Arctomys aureus.</i>	<i>Ovis poli.</i>
<i>Mus erythronotus.</i>	<i>Capra sibirica.</i>

whilst on the ranges north of Kashghar the following were observed:—

<i>Lepus stoliczkanus.</i>	<i>Capra sibirica.</i>
<i>Ovis karelini.</i>	<i>Sus scrofa</i> , var. <i>nigripes</i> .

The horns of *Cervus eustephanus* are said also to have been brought from the Thian Shan, and this animal is probably the *Cervus maral* of Severtzoff and Prejevalski.

In drawing up the present notes, I have received much aid from two officers of the Mission to Yarkand,—Captain Trotter and Captain Biddulph,—who assisted me by clearing up points left obscure in Dr. Stoliczka's diary, and who furnished me with notes on some of the animals observed by them. I am also indebted to Mr. R. B. Shaw and to Dr. Scully for both specimens and information. Dr. Günther did me the favour of comparing some of the skins with types in the Indian Museum. From Mr. Wood-Mason, who, in Dr. Anderson's absence, was in charge of the Indian Museum, I have received assistance of every kind, and also from Mr. Fraser, the Osteologist; and Dr. Anderson himself, since his return to India, has given me every facility for comparing and examining specimens. Without the aid kindly afforded me by the officers of the Museum, the present notes would be much more imperfect even than they are. Above all, I have to thank Colonel H. H. Godwin-Austen for the very great trouble he has taken in supervising the preparation of the plates in England—a long and tedious labour. The drawing and colouring of the plates has been delayed by a number of accidents, and, but for Colonel Godwin-Austen's assistance, the delay

<sup>1</sup> For details, see 'Ibis,' 1875, p. 97. The portion of Mr. Severtzoff's work relating to birds has been translated by Mr. H. E. Dresser in the 'Ibis' (l. c.), and many additional notes are added.

<sup>2</sup> Ann. Mag. Nat. Hist., Aug. 1876, Ser. 4, Vol. xviii, p. 130.

would have been far greater. During Colonel Godwin-Austen's absence from England in 1876-77, Mr. E. R. Alston very obligingly looked after the work.

This description of the mammalia collected by Dr. Stoliczka was originally written in 1875—nearly four years ago. The numerous additions since made to our knowledge of the mammalian fauna of Central Asia have rendered it necessary to rewrite a considerable proportion of the letter-press. The delay in publication has been caused by the time necessary for the preparation of plates.

Order CHIROPTERA.<sup>1</sup>

It could not be expected that many species of this order, of which fully two-thirds are limited to the tropical and sub-tropical parts of the earth, would be found in the cold and desert regions traversed by the expedition. Accordingly, the collection contains but six species; and of these one was obtained only in Kashmir. All belong to one family, the *Vespertilionidæ*, and all are well known European forms, or differ so slightly from their European allies, that they cannot be considered more than sub-species or varieties. The fur exhibits superficially the same pale colour in all the specimens which were obtained in dry sandy districts, a very constant character in bats inhabiting desert regions, as the writer has frequently pointed out.

Family—*VESPERTILIONIDÆ*.

## 1. VESPERUGO PIPISTRELLUS.

*Vespertilio pipistrellus*, Schreb. Säugth. I, p. 167, Pl. 54, (177b).

*Vesperugo pipistrellus*, Dobson, Monograph of Asiatic Chiroptera, p. 95; and Cat. Chiropt. Brit. Mus., 1878, p. 223.

Yangihissar, between Káshghar and Yárkand: Kashmir.

The collection contains a large number of specimens of this species, which is so widely distributed in Northern Europe and Asia. Those taken in the Yárkand region have the terminal half of the fur covering the back very pale yellowish-brown, almost buff, and the extremities of the hairs of the under surface are so light-coloured as to appear almost white in alcohol; while the specimens obtained in Kashmir are very dark coloured throughout, the extremities of the hairs being of a slightly paler colour than the base. The Kashmir specimens resemble *V. abramus* in the comparatively shallow emargination of the upper third of the outer side of the ear-conch.

## 2. VESPERUGO BOREALIS.

*Vespertilio borealis*, Nillson, Illum. Fig. Scandin. Fauna, häft 19, pl. 36 (1838).

*Vesperugo nilssoni*, Keys. Blas. Wieg. Archiv., 1839, p. 315.

*Vesperugo borealis*, Dobson, Mon. As. Chiropt., p. 105; Cat. Chiropt. B. M., p. 203.

Yangihissar and Kizil, Eastern Turkestan.

Although this species, the most northern of European and Asiatic bats, has not hitherto (so far as I can determine) been reported from any locality south of the Harz mountains in Europe and the Altai Range in Asia, I find in the collection three specimens of a bat which must be considered examples of it. They differ slightly in a few characters from specimens of *V. borealis* preserved in the museums, but not sufficiently so, in my opinion, to constitute a distinct species. In them the tragus reaches its greatest width slightly below the middle of the inner margin; the post-calcaneal lobe is very narrow; the edge of the

<sup>1</sup> All the identifications and notes on this order are by Mr. G. A. Dobson, M. A., M. B.

wing membrane between the fourth finger and the foot is faintly margined with white ; the outer upper incisor, on each side, is as long or slightly longer than the outer cusp of the inner incisor ; the lower incisors stand at right angles to the direction of the jaws ; the first lower premolar is about two-thirds the vertical height, but scarcely one-third the size of the second premolar. Fur pale yellowish-brown above, yellowish-white beneath ; the basal half of the hairs dark-brown on both surfaces. The hair of the back extends upon the interfemoral membrane rather densely as far as the end of the fourth caudal vertebra ; a fringe of fine straight hairs extends round the upper lip in front, beneath the nostrils, and along the sides.

### 3. VESPERUGO DISCOLOR.

*Vespertilio discolor*, Natterer, Kuhl. Deutsch. Flederm. Wetter. Ann. iv (1819).

*Vesperugo discolor*, Keys. Blas. Wieg. Archiv., 1839, p. 312.—Dobson, Mon. As. Chir., p. 106 ; Cat. Chir. B. M., p. 204.

One specimen taken at Kizil.

This agrees in all its principal characters with European specimens of the species, differing slightly in the form of the tragus, which is less broad above, reaching its greatest width about the middle of its outer margin. Post-calcaneal lobe distinct, rounded as in *V. pipistrellus*. Outer upper incisor, on each side, small, not equal to half the vertical extent of the inner incisor ; first lower premolar short and blunt, not half the vertical extent of the second premolar ; lower incisors not crowded, placed in the direction of the jaws.

Fur similar in colour to that of *V. borealis*, extending less densely upon the interfemoral membrane, and not forming a fringe along the upper lip in front beneath the nostrils. This absence of a thin fringe of hairs along the upper lip below the nostrils affords an easy method of distinguishing badly preserved skins of immature specimens of this species from *V. borealis*. This has not been previously noticed.

### 4. VESPERUGO SEROTINUS.

*Vespertilio serotinus*, Schreber, Säugth. i, p. 167, pl. 53 (1775).

*Vesperus serotinus*, Keys. Blas. Wieg. Archiv., 1839, p. 312.

*Vesperugo serotinus*, Dobson, Mon. As. Chir., p. 108 ; Cat. Chir. B. M., p. 191.

Kashmir.

This species is so widely distributed, and varies so much in the colour of the fur, that it has received not less than seven different names. The specimens obtained by Dr. Stoliczka in Kashmir differ from European forms in the colour of the fur only, which is pale-brown above and almost white beneath, the basal half of the hairs on both surfaces being dark.

### 5. SYNOTUS DARJILINGENSIS.

*Plecotus darjilingensis*, Hodgson, Horsfield, Ann. and Mag. Nat. Hist., 1855, xvi, p. 103.

*Synotus darjilingensis*, Dobson, Mon. As. Chir., p. 86 ; Cat. Chir. B. M., p. 177.

Yangihsar.

The single specimen in the collection agrees in the form of the ear with specimens examined by me from Darjiling, the Khási Hills, Masuri, Simla, and other Himalayan local-

ities. There is no trace of the small lobe which is found in the closely allied European species *S. barbastellus* (*Vespertilio barbastellus*, Schreber), projecting from the centre of the outer margin of the ear-conch. Nevertheless, so closely does this Himalayan and Central Asiatic form agree in all other respects with the European, that I must consider the former a sub-species only.

#### 6. PLECOTUS AURITUS.

*Plecotus auritus*, L. Syst. Nat., ed. XII, vol. i, p. 47.—Dobson, Mon. As. Chir., p. 84.; Cat. Chir. B. M., p. 178.

Leh, in Ladák.

The specimens obtained at Leh do not differ in any respect from *P. auritus* of Europe, except in the slightly paler colour of the extremities of the hairs and membranes.

The following species, though not represented in the collection, will most probably be hereafter found in the regions lying between Kashmir and Yárkand :—

*Rhinolophus ferrumequinum*, Schreber.—This has been found in Kashmir, at Masuri, and in Nipal, and extends through Northern Asia, westwardly, to Europe as far as England, and, eastwardly, to Japan.

*Rhinolophus hipposideros*, Bechstein.—Extends from Asia Minor to Ireland.

*Vespertilio murinus*, Schreber.—Generally distributed throughout Europe, North Africa, and the temperate regions of Asia, extending from the North-West Himalayas to England.

*Vespertilio longipes*, Dobson.—Kashmir (caves of Bhima Devi, 6,000 feet).

*Vespertilio mystacinus*, Leisler.—North-West Himalayas, probably distributed throughout the whole range, and thence, westwardly, to Ireland.

*Harpicephalus auratus*, Milne-Edwards.—Eastern Tibet.<sup>1</sup>

*Harpicephalus leucogaster*, Milne-Edwards.—Eastern Tibet, North-Western Himalayas.

*Vesperugo noctula*, Schreber.—Generally distributed throughout the Himalayas, Asia, Europe, and Africa, in the tropical parts of these continents, apparently inhabiting mountainous regions only.

*Vesperugo leisleri*, Kuhl.—From the Himalayas, through Central Asia, to Europe.

*Vesperugo maurus*, Blasius.—Inhabits the mountainous regions of Asia and Europe, from Java through the Himalayas to the Alps, extending to the Canary Isles westwardly, and eastwardly to the east coast of China.

<sup>1</sup> The two species of *Harpicephalus* are from Moupin in the forest region of Eastern Tibet, and consequently from a part of the Oriental and not of the Palæarctic region. As already explained in the introductory remarks, Père David's Moupin collections were chiefly obtained from a country which, altho ugh usually classed as part of Tibet, has a totally different fauna from that of the Tibetan plateau.—W. T. B.

## Order INSECTIVORA.

Family—*ERINACEIDÆ*.7. *ERINACEUS ALBULUS*. Pl. I, fig. 2, and Pl. Ia, fig. 1.

*Erinaceus albiventris*, Wagner, *apud* Henderson, Lahore to Yarkand, p. 113, *nec* Wagner.  
*Erinaceus (Hemiechinus) albulus*, Stoliczka, Journal of the Asiatic Society of Bengal, 1872, xli, Pt. 2, p. 226.  
? *E. auritus*, Prejevalski, Pet. Mitt. Erg. Hgt. No. 53, p. 9.  
*Kirpa*, Turki of Yarkand.

1 (skin) Kárghalik, south of Yarkand; 2, 3, 4 (skins); 5 (skeleton) Yarkand; 6, 7 (skins) Yangihissar; 8 (skin) Jigda, north of Káshghar.

The type of this species was obtained by Dr. Henderson when accompanying the first Yarkand Expedition, and presented to the Indian Museum, Calcutta. This specimen was obtained a little north of Sánju. The following is Dr. Stoliczka's original description of the species (*l. c.*) :—

“ Snout very long and pointed, ears moderate, ovate at tip; spines irregularly placed, much as in *pictus*,<sup>1</sup> but comparatively longer and thicker; each of them is dusky at the base, then up to half its length purely white, followed by a blackish-brown ring, its breadth being only about one-fifth of the total length, tip largely white and rather abruptly pointed, the result being a prevalence of white colour on the upper surface of the body. There is no perceptible nude space between the ears, and the spines begin immediately on the hind neck, and the largest on the back are fully one inch long. Each spine is surrounded by 24 to 26 fine longitudinal furrows, separated by minutely tuberculated ridges, scarcely wider than the furrows. The tail is almost as short as in *pictus*.

“ Head entirely rufescent above and at the sides, except the upper mandible towards the angle of the mouth, this being white; base of ears also white, as well as the entire underside, which is thickly set with long hairs passing into a slight rufescent shade on the sides of the belly. Ears, lower portions of front and hind feet, and tail dusky-brownish, being thickly intermixed with short white hairs; moustache brown, whitish towards the tip. Claws strong, five on each foot, very pale-brownish.

“ The only specimen measures very nearly seven inches; the ear slightly exceeds one inch; distance from tip of snout to the angle of the mouth not quite one; to the ear slightly more than one and a half inches. Dr. Henderson gives the locality ‘Langur near Sánju, Yarkand,’ and the native name ‘*keepa*.’<sup>2</sup>

“ The only known form to which the present species is closely allied is *E. lybicus*, Ehrenb., which has similarly grooved and similarly coloured spines, but they are decidedly shorter, and the colouration of the other parts of the body is different.”

<sup>1</sup> *E. pictus* is a species described from Cutch by Dr. Stoliczka. It is very closely allied to *E. micropus*, of which it may not be more than a variety, but it appears always to possess a malar bone, which is wanting in the skull of *E. micropus*. Anderson, J. A. S. B., 1878, xvii, Pt. 2, p. 201.

<sup>2</sup> This is a misreading or misprint: the name is ‘*kirpa*.’

On the label of one of the specimens from Kárghalik, a male, the following details, evidently from the fresh specimen, are given in Dr. Stoliczka's handwriting:—

	Inches.
“ Whole length	8·2
Length of head	2·3
Do. of tail	0·7
Snout to eye	1·17
Do. to base of ear	1·75
Length of ear from front base	1·5
Ditto from hind do.	1·45
Breadth of ear	1·2
Length of gape	1·2
Do. of fore foot with claws	1·25
Do. of hind foot	1·6

“ The snout projects 0·4 inch beyond the lower jaw; the distance between the fore feet when expanded is 8·2 inches; between the hind feet 9 inches. Iris black, snout blackish, outer edges of nostrils ciliated, head pale rusty, entire under surface white, as well as behind the ears, along [the edge of the area covered by] the spines all round the white is fringed with very pale rusty; ears, feet, and tail silvery brownish-grey; claws fleshy white, soles blackish. Tongue elongately oval, and very thick.”

The longest spines are a little less than an inch in length in most specimens. The irregularity of the spines, I think, depends on the manner in which the skin has dried.

There is no variation of importance in the different specimens.

The skeleton is that of an animal not quite adult. The skull measures 1·9 inches long by 1·1 broad across the zygomatic arches, and 0·5 between the orbits.

The following are measurements of an old skull with worn teeth taken from one of Dr. Stoliczka's specimens:—

	Met.	Inches.
Length from occipital plane to anterior end of premaxillaries	·050	2
from lower margin of foramen magnum to ditto	·048	1·93
„ of bony palate from opening of posterior nares	·028	1·15
„ of suture between nasal bones	·015	0·6
Breadth across zygomatic arches	·030	1·23
„ of brain pan at posterior termination of zygomata	·023	0·94
Least breadth of frontal region between orbits	·012	0·51
Breadth of nasals	·002	0·1
Length of first true molar	·005	0·18
Breadth of ditto	·006	0·22
Length of lower jaw from angle	·037	1·48
Approximate height of ditto	·017	0·7

On Plate Ia, the figures 1, 1a, 1b, are taken from a very old skull; 1c, 1d, 1e, 1f, from the young, immature skull belonging to the skeleton obtained at Yárcand, the latter being added in order to show the form of the teeth, which are worn down to a flat surface in the aged skull represented in the upper figures.

*Erinaceus albulus* is a very near ally of *E. auritus*, the species inhabiting Eastern Europe and Northern Asia; indeed so close is it, that, as Dr. Anderson has pointed out to me, there is no external character by which dried specimens, at all events, can be distinguished. All the teeth of *E. auritus* are, however, very much smaller, and although the general outline of the skull is similar, that of *E. albulus* is larger; the occipital portion is differently shaped, and there are several minor differences. The only specimen of *E. auritus* for comparison in the Indian Museum is from the Volga, and it is far from improbable that other specimens from further east may show a passage into *E. albulus*.

Family—*SORICIDÆ*.

8. *SOREX (Crocidura) MYOIDES*. Pl. I, fig. 1, and Pl. Ia, fig. 2.

W. Blanf., J. A. S. B., 1875, xlii, Pt. 2, p. 106.

S. (*Crocidura*) *parvus*, *murinus*, *subtus albescens*, *pedibus albidis*, *pilis brevibus*, *sparsis indutus*, *caudâ supra fuscâ*, *subtus albescente*, *setis brevissimis confertim annulatâ*, *pilis longiusculis hic inde instructâ*, *auriculis mediocribus*, *rostro subtus albido*. *Long. corporis cum capite 2·1*, *caudæ 1·5*, *pedis posterioris cum tarso 0·5*, *auris 0·22 poll. angl.*

1 ♀, in spirit, from Leh, in Ladâk.

Mouse-brown above, white below, the fur being slaty at the base throughout; muzzle with numerous whiskers (*vibrissæ*), the uppermost of which are brown, the lower white; the longest about three-quarters of an inch; lower surface of muzzle and chin white, with a few long hairs. Ears moderate, rounded, about as broad as they are high, almost naked. No lateral-glands. Fore-feet whitish, thinly clad, with white hairs above. External surface of thigh and tarsus brown, inner surface whitish; lower part of thigh and tarsus very thinly clad; soles of feet naked, light brown. Tail about two-thirds the length of the head and body, moderately thick, with very close rings of short hairs, and a few scattered longer hairs.

The following dimensions, especially those of the ear, being from a specimen preserved in spirit, are somewhat less than they would be in a living animal:—

	Inches.
Whole length from nose to end of tail	3·6
Tail from anus	1·5
Height of ear from orifice	0·23
Breadth of ear-conch	0·22
Longest whisker	0·73
Length of fore foot (palma)	0·35
Do. of hind foot (planta)	0·5

Teeth  $28 - i \frac{2+4}{2}, c \frac{1-1}{1-1}, m \frac{4-4}{4-4}$ . The posterior process of each upper central incisor is about the same size as the canine. The second incisor from the middle is about three times the

height of the third, and its length is equal to that of the outer incisor and canine together. The outer incisor is very small; less than the canine.<sup>1</sup> All the teeth are white.

	Met.	Inch.
Length of skull . . . . .	.017	0.74
Do. of bony palate in front of posterior nares . . . . .	.008	0.32
Breadth of skull where broadest near occiput . . . . .	.008	0.34
Length of mandible (incisors not included) . . . . .	.009	0.38

The above description is taken from the only specimen in the collection, a female. It was obtained at Leh on the 9th September, and appears fairly adult, though the basi-occipital suture has not disappeared. All the teeth are fully grown. The species appears nearly allied to *S. guldenstaedtii* of Pallas,<sup>2</sup> but that is differently coloured (dusky ash), larger, and is said to have very small ears. Another closely affined form is *S. fumigatus* of De Filippi<sup>3</sup> from Northern Persia, but that is dark lead colour above, ashy beneath. The tail is proportionately much shorter in *S. myoides* than in any Himalayan species with which I am acquainted belonging to true *Crocidura*, or than in the Tenasserim *S. fuliginosus*.<sup>4</sup>

A species of shrew was observed near Lake Lob by Prejevalski, but it has not yet been described.

#### Order CARNIVORA.

##### Family—*FELIDÆ*.

###### 9. *FELIS CATUS*.

Linn., Syst. Nat., Ed. xii, 1766, i. p. 62.

*Yawa mashak*, Turki of Yarkand (Scully).

A skin of a wild cat, without the skull, brought by Dr. Scully from Eastern Turkestan, agrees very well with that of the common wild cat of Europe, except that the tail tapers instead of being cylindrical, and that the dark marks are rather indistinct. The bars on the tail and legs correspond with those of *F. catus*.

###### 10. *FELIS SHAWIANA*. Pls. Ib. Ic.

W. Blanf., J. A. S. B., 1876, xlv, Pt. 2, p. 49.

*F. sp. near F. pardinus* (? *Chaus caudatus*, Gray.) W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 106.

*Molun*, Turki of Yarkand.

*Felis F. domesticam magnitudine superans, ad F. chaus proxime accedens; griseo-fulva, nigro-maculata, subtus alba atque maculis nigris majoribus ornata; caudâ breviusculâ, supra, apicem versus, nec infra, nigro-transfasciatâ, cranio elongato, ei F. viverrinæ simili, vellere molli, basin versus pallide purpurascenti-griseo: longitudine (sc. pellis) sine caudâ bipedali, caudæ 7—8 unc., cranii 4.25.*

1. Skin without skull or feet, purchased in Yarkand.

Amongst the collections made by Dr. Stoliczka in Eastern Turkestan, was an imperfect skin of a cat. Although I thought it probable that it belonged to an undescribed form, there was a bare possibility that it might be a specimen of a species inhabiting Western

<sup>1</sup> The names of the teeth are in accordance with the determinations by Brandt, Zool. Record, 1866, p. 26, and Bull. Soc. Hist. Nat. Mosc., xli, pp. 76-95.

<sup>2</sup> Zoog. Ros. As., i, p. 132, pl. IX, fig. 1.

<sup>3</sup> Arch. p. la Zool. Genova, ii, p. 379; Note di un Viaggio in Persia, p. 343.

<sup>4</sup> Blyth, J. A. S. B., xxiv, p. 362.

Turkestan and described by Dr. J. E. Gray<sup>1</sup> in 1873 as *Chaus caudatus*. The tail was certainly much shorter than was represented in Dr. Gray's figure, but this might have been due in part at least to a portion having been lost. Accordingly, in the published list of the collections, I noted the species as *Felis* sp. near *F. pardina* (? *Chaus caudatus*, Gray.)

Subsequently, in 1876, two additional skins of the same cat were brought from Yarkand, one by Mr. Shaw and the other by Dr. Scully. Neither is perfect, but Mr. Shaw's specimen only wants the paws, and the whole skeleton has been preserved with the skin. It was evident that the species was quite distinct from *Chaus caudatus*, the tail being considerably shorter, and the skull of quite a different form. I consequently described this apparently new form, and named it after Mr. R. B. Shaw, to whom we are so much indebted for our present knowledge of Eastern Turkestan.

*Description.*—General colour pale greyish fulvous above, the back rather darker than the sides, underparts white; the body marked throughout with rather small black spots, which are largest on the abdomen, smaller and closer together on the shoulders and thighs, tending to form cross lines on the latter, and indistinct on the middle of the back; anterior portion of the face and muzzle whitish, cheek stripes of rusty red and black hairs mixed. Ears rather more rufous outside, especially towards the tip, which is blackish-brown and pointed, the hairs at the end scarcely lengthened; interior of ears white. There are some faint rufous spots at the side of the neck. Breast very faintly rufous with one narrow brownish band across. Inner side of limbs mostly white, a black band inside the forearm, and a very black spot behind the tarsus. Apparently there are two black bands inside the thigh, but the limbs are ill-preserved in all the specimens. Tail dusky above near the base, with 5 or 6 black bars above on the posterior half, none below, the dark bars closer together towards the tip. Fur soft, moderately long, purplish-grey towards the base.

The size appears rather to exceed that of a domestic cat, and to equal that of *F. chaus*. The tail apparently is about half the length of the body without the head. In the two best skins examined, the length from nose to rump is about 25 inches, the tail 7 to 8, but very little dependence can be placed on such measurements. The tail-vertebræ from the posterior end of the sacrum measure when put together 8·75 inches, which would coincide with a tail measurement outside the body of about 7½ inches.

The skeleton is that of an adult animal, and the following are dimensions of the skull and limb bones:

	Metre.	Inches.
Total length of skull . . . . .	·108	4·25
Length from incisors to lower edge of foramen magnum . . . . .	·093	3·67
Breadth across hinder parts of zygomatic arches . . . . .	·073	2·87
,, behind postorbital processes . . . . .	·031	1·23
Least breadth of face between orbits . . . . .	·020	0·8
Length of suture between nasal bones . . . . .	·025	1·
Greatest diameter of bony orbit . . . . .	·032	1·25
Length of bony palate behind incisors . . . . .	·041	1·63
Length of mandible . . . . .	·073	2·88
Height of do. from the angle to the top of the coronoid process . . . . .	·033	1·3
Length of femur . . . . .	·140	5·52
,, of tibia . . . . .	·141	5·57
,, of humerus . . . . .	·126	4·95
,, of radius . . . . .	·133	5·26

<sup>1</sup> P. Z. S. 1874, p. 31, Pl. VI, VII.

Compared with the skull of *Felis chaus*, that of *F. shawiana* is comparatively longer, it has the nasal portion more elongate, the face less convex, the breadth behind the postorbital processes less, whilst the processes themselves are longer and project further. The true lynxes have an even shorter and more convex skull, and so have the smaller typical cats. The skull of *Chaus caudatus* approximates to that of the true cats, being rounder and shorter than that of *F. chaus*. The only skull I can find which approaches in form to that of *Felis shawiana* belongs to *F. viverrina*, the type of Gray's genus *Viverriceps*, a cat with a peculiarly long head.

*Felis shawiana* is distinguished externally from *F. (Chaus) caudata* by its much shorter tail, from *F. chaus* by being spotted throughout, and from *F. torquata* (*F. ornata*, Gray) by its shorter tail, more rufous colouration, and distinct black spots on the abdomen. It is very different from *F. euptilura*,<sup>1</sup> which has red spots on the sides and rufous bars across the breast.

This cat appears to be common in the plains of Eastern Turkestan, around Káshghar and Yárkand. Dr. Stoliczka has noted on the label of the original skin that the animal is found abundantly, and I have received the same account from Captain Biddulph, Dr. Scully and Mr. Shaw.

In the figure on plate 1b, the black spots on the belly have been omitted. Three views of the skull are given on plate 1c.

#### 11. FELIS UNCIA.

Schreb., Säugth., i, p. 386, Pl. C.

1, Adult skin (probably purchased) sent from Leh; 2, Skin of young animal without label; 3, skull of young animal purchased at Káshghar, and said to have been brought from Sarikol (the two last very possibly belonged to the same individual).

The occurrence of the ounce, or snow leopard, as it is called by sportsmen, on the Pámir, might have been anticipated. It is found in parts of Southern Siberia,<sup>2</sup> throughout Tibet, on the Altyn-tagh, south of Lob-nor, and in Western Turkestan. To the east it extends to the Amur, where Schrenk found it abundantly, and it occurs to the westward on the mountains of Persia, Armenia and Asia Minor, being found in the latter country near Smyrna.<sup>3</sup>

#### 12. FELIS LYNX.

Linn., Syst. Nat., i, p. 62.

*Salesan*, Turki of Yárkand (Scully).

1, 2, Skins (without skulls or feet) purchased at Káshghar.

Two fine skins, removed, without cutting open the belly, by an incision from the insertion of the tail to between the thighs, are marked as purchased for Government by Captain Chapman in Káshghar; one is said to have been brought by an Aksu merchant. Both belong to the European form of lynx, and not to the much paler *F. isabellina*<sup>4</sup> of Tibet.

<sup>1</sup> Elliot, P. Z. S. 1871, p. 761, Pl. LXXVI.

<sup>2</sup> Pallas, Zoog. Ros. As., i, p. 17; Middendorf, Sib. Reis., ii, 2, p. 75.

<sup>3</sup> Danford and Alston, P. Z. S. 1877, p. 272.

<sup>4</sup> J. A. S. B. xvi, 1847, p. 1178.

The only difference I can see from a fine Norwegian skin in the Indian Museum is that the Káshghar specimens are rather more rufous.

The colour of the upper parts generally is pale-brown with a slight lilac tinge, darkest on the back, but with no distinct central stripe ; the under-fur is light orange brown, the extreme tips of the longer hairs are sometimes black, sometimes white, thus producing a slight silvery appearance.

The tail is 7 or 8 inches long (probably somewhat stretched), about 3 inches at the end being black. The ears are tipped with black, and have black tufts at the extremity, an inch to an inch-and-a-half long ; abdomen white with a few small black spots. The indications of spots on the sides and limbs are very faint indeed.

Family *CANIDÆ*.

13. *CANIS LUPUS*.

Linn., Syst. Nat., i, p. 58.

1, 2, Flat skins purchased at Káshghar ; 3, 4, flat skins without label.

The four skins in the collection may be referred apparently rather to *C. lupus* than to *C. laniger* : according to Mr. Blyth,<sup>1</sup> the Tibetan wolf, *Lupus laniger*<sup>2</sup> of Hodgson, is distinguished by its paler colour, owing to the absence of black-tipped hairs on the sides, and the distinct black streak on the forelimbs of the European wolf is but slightly indicated in the Tibetan animal. The fulvous of the European wolf is replaced by a delicate light isabelline, or rufous cream-colour. Mr. Blyth also points out that *C. laniger* is a slighter animal with smaller paws, and he mentions some cranial differences, but, on the whole, he appears doubtful whether the Tibetan wolf is worthy of specific distinction.

On the whole, however, naturalists appear fairly agreed that the two races must be distinguished. There is one peculiarity at least in which the Tibetan wolf agrees better with the Indian species, *C. pallipes*, than with *C. lupus* ; this is the proportion of the 'carnassial tooth' in the upper jaw to the true or tubercular molars. In the European wolf the length of the carnassial tooth exceeds that of the two molars together ; the reverse is the case in the Indian wolf. On examining the skulls of Tibetan wolves in the Indian Museum<sup>3</sup> I found that they agreed in this particular with those of *C. pallipes*, and differed from *C. lupus*. The importance of the distinction has been pointed out in a pamphlet by Professor Jeitteles of Vienna, who has shown that none of the larger domestic dogs can be descended from the European wolf because of the relative proportions of their teeth, but that all must have been derived from the Indian wolf, or from allied forms. Professor Jeitteles' remarks induced me to examine the Tibetan wolves' skulls.

In the absence of the skull, it is, of course, impossible to say with certainty that the wolf of Eastern Turkestan is the same as *Canis lupus*, but it is probable that the two are identical.

<sup>1</sup> J. A. S. B., 1847, xvi, p. 1176.

<sup>2</sup> Hodgson, Calc. Jour. Nat. Hist., 1847, vii, p. 474, *Canis chanco*, Gray, P. Z. S., 1863, p. 94. Although in the same year, 1863, a specimen of *C. laniger* with a skull was presented by Mr. Hodgson to the British Museum, it appears doubtful whether this specimen was compared by Dr. Gray with his *C. chanco*, for in the catalogue of carnivorous, &c. mammalia, published in 1869, Hodgson's species is simply placed with a query under *Lupus chanco*. Hodgson distinctly stated that his *L. laniger* was the Tibetan *chanco*, but his specimen was from the country north of Sikkim ; Gray's from Western Tibet (Chinese Tartary).

P. A. S. B., 1877, p. 116.

The skins purchased at Káshghar are rather large ; the hair is long and appears to me rather softer than in most wolf-skins ; between the shoulders it is nearly 5 inches in length. The under-fur is ashy-grey and woolly. Black tips to the hair abound on the forehead, back, upper part of tail, thighs and shoulders, being thickest along the middle of the back. Ears outside brown with black hairs mixed : inside there are white hairs with black mixed near the margins. The black line down the fore-leg is distinct. Two skins are more fulvous, the others more grey ; one of the latter is smaller than the rest, and has more black on the back and tail, whilst the muzzle, which is rufous in the other skins, is in this case blackish. I think this may be the skin of a younger animal.

Hayward<sup>1</sup> states that two kinds of wolves are found in Eastern Turkestan. One is probably the present species ; the second may be either the animal noticed below, or *Canis (Cuon) alpinus* of Pallas, which is said by Severtzoff to be met with in Western Turkestan, but not at lower elevations than 5,000 feet.

#### 14. CANIS SP.

1. Skin without skull purchased at Káshghar.

This skin belongs to a small species, rather larger than the common jackal. The general colour is very like that of a wolf, and the fur about equally coarse and rather long. The prevailing tint is black, mixed with pale rufous and white, along the back and upper surface of the tail ; pale rufous on the flanks, limbs, anterior portion of the abdomen and under the tail. There is a distinct black line down the front of each foreleg. The upper part of the head is rufous, mixed with whitish and black, the forehead being greyer owing to the predominance of white tips to the hairs, which are chocolate-brown at the base. Whiskers black ; upper lip, chin and throat white. Hairs on the outside of the ears short, brown, with short black tips, inside longer and white. On the back of the neck the hairs are three to four inches long, ashy at the base, then darker, the terminal portion for about an inch rufous-white, the extreme tips black. On the middle of the back the hair is more than four inches long, at the base brownish-ashy mixed with white ; the white extends only about an inch, then, for about  $1\frac{1}{2}$  inches, the hairs are chocolate-brown, the terminal portions rufescent and black, the black tips much longer than on the neck. On the tail the extreme basal portion of the hair is ashy, the remainder rufescent, except the tip, which is black. Sides the same but without black tips, the blackish area on the back bounded by a fairly defined line on the sides. The tip of the tail is quite black, owing to all the hairs having long black tips. The under-parts are greyish-white, slightly mixed with rufous on the breast and anterior portion of the abdomen, and with black tips to many of the hairs on the breast, the under-fur being ashy throughout.

The tail is short as in the jackal, but more bushy. Ears moderate, much shorter in proportion than in foxes or wolves. Feet larger than in *C. aureus*.

I cannot identify this with any known canine animal. It is too large, as already remarked, for a jackal, and has much longer, fuller fur. It is too small for *C. alpinus* of Pallas, which, moreover, is a far more rufous animal with a proportionally longer tail,<sup>2</sup> and is said

<sup>1</sup> Jour. Roy. Geog. Soc., 1870, xi, p. 134.

<sup>2</sup> Compare Schrenck, Reis. Amur., vol. i, p. 48.

by Gray<sup>1</sup> to have the dentition of *Cuon*. The description of *Canis* (or *Vulpes*) *melanotus* would agree fairly, but that the ears are black in that animal, which is evidently a fox with a long bushy tail, and apparently, from the description, a much smaller animal than the present. I know of no other Central Asiatic form with which to compare this skin. It differs in colour and texture of fur from the equally unknown *saggurg*<sup>3</sup> of Persia. I can only conclude that the skin described belongs to a large kind of jackal, hitherto undescribed; but I am unwilling to give a name to a mere skin without a skull in so difficult a genus as restricted *Canis*, and it is barely possible that the skin may be that of a young wolf. The colouration is not unlike that of the African *C. mesomelas*, but much paler and greyer.

It was very probably a skin of the same animal, also from Chinese Tartary, which was referred with doubt by Mr. Blyth<sup>4</sup> to *Canis melanotus*. This skin has disappeared, having probably decayed.

15. *CANIS (Vulpes) FLAVESCENS*. Pl. II, (as *Canis (Vulpes) montanus*).

*Vulpes flavescens*, Gray, Ann. Mag. Nat. Hist., Ser. 1, xi, p. 118, (1843): List Mam. B. M., p. 60 (1843): Cat. Hodgson's coll. B. M., p. II. (1846): Do. second edition, p. 6 (1863): P. Z. S., 1868, p. 516: Cat. Carn. &c. Mam. B. M., p. 203 (1869).—Adams, P. Z. S., 1858, p. 516.—Blyth, Cat. Mam. As. Soc., p. 42.

*Tulké*, Turki of Yárkand.

1, 2, skins (no skulls or feet) purchased at Leh; 3, skin (and a skull detached) Marálbáshi; 4—8, skins (without skulls or feet) purchased in Káshghar; 9, skin (with skull and feet) Káshghar, from an animal presented alive to the Mission; 10, head and skull, no label.

After much study of the skins available, and with much doubt, I have determined to follow Mr. Blyth, and to class the foxes of Ladák and Yárkand apart from the common *Vulpes montana* of the Himalayas. That the two are closely allied is certain, and it is extremely doubtful whether any definite characters can be found to distinguish them, but so far as the specimens available for examination show, the northern race is larger, paler in colour, and often more rufous, with longer hair (a difference due, doubtless, to climate), and with much larger teeth. Still there is so much variation in all these characters, that I was long inclined to class all together as varieties of one species, and I am still far from satisfied that any constant distinction exists. Under the impression that the two were not separable, the plate representing the Yárkand foxes was named *Canis (Vulpes) montanus*. I think, however, that the differences between several recognized races of foxes are no greater than those between *V. montana* and the Tibetan animal, and I therefore leave the two forms separate for the present.

The Tibetan specimen in the Indian Museum, referred by Mr. Blyth in his Catalogue of the Mammalia in the Museum of the Asiatic Society to *V. flavescens*, appears to me identical with some of the skins from Káshghar. There is still a possibility that Mr. Blyth's *V. flavescens* may not be the same as Gray's original type of the species in the British Museum; this was a purchased specimen, said to have been brought from Persia. Subsequently, in his Catalogue of the Carnivorous, Pachydermatous and Edentate Mammalia,

<sup>1</sup> P. Z. S., 1868, p. 498: Cat. Carn. &c., Mam., p. 184.

<sup>2</sup> Pallas, Zoog. Ros. As., i, p. 44.

<sup>3</sup> Eastern Persia, ii, p. 38.

<sup>4</sup> Cat. Mam. Mus. As. Soc., p. 39.

published in 1869, Dr. Gray gave the Punjab Salt Range as the locality, on the authority of a specimen presented by Dr. Oldham. If this be right, the true *V. flavesiensis* may be the same as *V. pusillus*<sup>1</sup> formerly identified<sup>2</sup> by its describer, Mr. Blyth, with *V. flavesiensis*, but subsequently considered distinct. Dr. Leith Adams, however, identified a fox, of which he purchased specimens at Leh, with *V. flavesiensis*, and as his skins were compared at the British Museum, his identification is in all probability correct, whilst there can be but little question that all the fox skins usually brought for sale at Leh belong to the same species as those obtained by Dr. Stoliczka. The identification is, I admit, by no means perfect.

The most prominent distinction between the foxes of Eastern Turkestan and the true *V. montana* of the Himalaya appears to be in the size of the teeth. As a rule, the skulls of the former are larger, but one skull of *V. montana* in the Indian Museum scarcely differs in measurement from that of the Marálbáshi specimen of *V. flavesiensis*. The former is 5.6 inches long from the occipital plane to the end of the premaxillaries, by 2.95 broad across the zygomatic arches, and the lower jaw measures 4.35 from angle to symphysis. The following are the dimensions, in parts of an inch, of the three hindmost teeth of the upper jaw in the two skulls:—

	<i>V. flavesiensis.</i>		<i>V. montana.</i>	
	Length,	Breadth,	Length.	Breadth.
p. m. 1 . . . . .	0.62	0.32	0.53	0.27
m. 1 . . . . .	0.43	0.55	0.37	0.45
m. 2 . . . . .	0.25	0.4	0.22	0.31

There is some variation, but the difference is considerable in all the skulls I have examined.

All these Asiatic foxes, although differing considerably in colour, are near allies of the common European fox. Comparing the Marálbáshi skull with that of *V. vulgaris*, I notice considerable difference in the teeth. In *V. vulgaris* the last molar is much shorter transversely in proportion to its length from front to back of the jaw; the hinder margin is nearly a straight line, whilst in the Yárkand skull it is concave. The penultimate molar in the latter, too, is broader than it is in any of the European skulls I have examined. There is, however, sufficient variation amongst the teeth of these skulls to render it doubtful how far specific characters can be made to depend upon them alone.

The auditory bullæ of the Yárkand skull are larger than in *V. vulgaris*, or than in most specimens of *V. montana* from the Himalayas.

Amongst the skins obtained from Eastern Turkestan and Ladák, some are pale rufous, like Mr. Blyth's specimen, whilst in others there is an admixture of greyish and blackish tints owing to the prevalence of black tips on the hairs. The latter, which are probably younger individuals, approach *V. montana* in colouration. The difference is most marked on the external surface of the limbs, which are pure bright rufous in some animals, whilst in others they are dark rufous grey with a blackish margin to the white inner portion of the fore-leg. The under-fur in all these foxes, *V. flavesiensis* or *V. montana*, is similarly coloured, the woolly hairs being purplish-grey with, on the back, bright rufous tips. The colouration is, however, darker in *V. montana*, and, owing to the tips of the longer hairs being less developed, the colour of the under-fur shows more.

<sup>1</sup> J. A. S. B., xxiii, 1854, p. 729.

<sup>2</sup> J. A. S. B., xxii, 1853, p. 581.

In the plate, the upper figure represents the darker variety of *V. flavescens*, the lower the more rufous and typical form.

A specimen of a fox from Yarkand presented by Captain Biddulph to Mr. Hume, who has added it to the collection, looks at first sight as if it must be a different species. The hair is much shorter and thinner than in the other foxes, and that on the tail is so deficient, that there is nothing approaching a brush, and the tail resembles that of a domestic dog. This may be due to accident or ill condition, but the hair on the body, though not long, looks perfectly healthy. There is no woolly under-fur, and the hair is rather harsh. On the whole, I think this skin may be that of an animal which has just lost its long winter coat. That the loss of the long fur greatly alters the colour of foxes is a well-known fact.

The following is a description of this skin. All the middle of the back, from the nape to the insertion of the tail, is blackish-brown; sides of the body isabelline, many of the hairs on the posterior part of the flanks having very long black tips, so that the blackish back appears broader on the loins than behind the shoulders; the hairs are dusky at the base on the loins, whitish near the shoulders; head rufous above, with scattered white tips to some of the hairs; upper lip whitish, as are the chin, throat and lower parts generally; whiskers black; ears black externally except close to the head, with rather long whitish hair near the margins inside. External surface of shoulders and thighs rufous, with a few white and black tips mixed. Anterior portion of the whole fore-leg and foot, and of the tarsus and hind-foot, black, slightly grizzled with white tips and becoming more mixed with rufous hairs above, but quite black along the edge of the whitish inner-surface of the limbs. Hairs beneath the feet dusky-brown; below the tarsus rufous brown; tail dull rufous above, below whitish near the base, becoming much mixed with black towards the tip, which is entirely white both above and below; the hair on the back is about  $2\frac{1}{4}$  inches long.

The following measurements, except those of the skull and leg bones, are, of course, only approximate, as they are taken on the skin:—

	ft. inches.
Length of head and body . . . . .	2 0
Tail, including hair at end . . . . .	1 6
	<hr/>
	Total length . . . . .
	3 6
	<hr/>
Length of ear from orifice . . . . .	3.5
Length of skull from occipital plane to end of premaxillaries . . . . .	5.95
Breadth of skull across widest part of zygomatic arches . . . . .	3.1
Length of tarsus and hind-foot to end of claws . . . . .	6.
Fore-foot and carpus to ditto . . . . .	3.5

Since the above was written, I have seen a skin of a fox brought by Captain Biddulph from Kashmir, apparently *V. montana*, with a similar colouration to the specimen above described, except that the back is dark rufous. This specimen, shot in August, has evidently its summer fur. In all these foxes the deep rufous cross-like mark, formed by the dark back and the line across the shoulders, is conspicuously contrasted, in the summer vesture, with the pale sides of the animal, but disappears in the winter fur.

## 16. C. (VULPES) sp.

1, Skin without skull purchased at Káshghar.

There is one skin purchased, like the others, in the Káshghar bazar, which differs from all the rest in being smaller and very much darker in colour. The difference in size is especially shown by the smaller feet. The dark colour is due partly to the prevalence of black tips to the fur, partly to the dark under-fur being more conspicuous, owing to the longer piles being fewer in proportion, and having shorter tips. It is probable that this is a different fox, but it is possible that it may be a young animal, for young foxes are sometimes much more dusky in colour than adults. It does not agree with the description of *V. ferrilatus*<sup>1</sup> to which Dr. Stoliczka at first sight thought it might be referred.

The general colour may be described as rufous iron-grey, grizzled with white tips to the hairs. The under-fur is dusky ashy-grey near the body, passing into chocolate-brown towards the extremities; the longer hairs are more or less rufous, white beyond the ends of the woolly under-fur, the tips of a large proportion being black; the upper surface of the head, middle of the back and a band along the tail are more rufous, there being comparatively few black hairs on the face except in a blackish patch on each side in front of the eye. The region below the eyes is brighter rufous, and the upper lip is whitish. The exterior surface of the legs are blackish with some rufous, and very short white tips to the hairs, the interior surface light-brown. The hairs below the feet and the tarsi are dull brown. The soles of the feet are much covered with hair as in *V. flavescens*. The ears are black outside except near the base. The hair of the tail is pale grey at the base, then tawny with black tips. The end of the tail is white.

In the process of preserving the skin, nearly all the hair has been removed from the inside of the ears; but one small tuft, which is black, remains in the middle of one ear. In *V. flavescens* all the hair inside the ears is pale isabelline. This difference tends to show that the small dark skin may belong to a distinct and undescribed species. It is useless, however, to give a name to a single imperfect specimen.

The foxes of Western Turkestan, according to Severtzoff, are *C. vulpes*, *C. melanotus*, and *C. corsac*. Hitherto neither of these has been found in Eastern Turkestan, unless *C. flavescens* be a mere variety of *C. vulpes*.

Family—*MUSTELIDÆ*.

## 17. MELES, sp. nov.

1 flat skin (without skull or feet) purchased at Káshghar.

I am unable to refer this skin to any known species. It differs in the colouration of the face from *M. taxus*, *M. canescens*,<sup>2</sup> *M. leucura*,<sup>3</sup> and *M. leptorhynchus*,<sup>4</sup> in all of which the white mark down the middle of the face extends to the nape, whereas in the Káshghar skin the light portion of the face terminates abruptly in front of the ears. It differs from *M. anakuma*<sup>5</sup>

<sup>1</sup> J. A. S. B., 1842, xi, p. 278.

<sup>2</sup> W. Blanf., Eastern Persia, ii, p. 44, Pl. III. The distinction of this species from *M. taxus* is shown to be doubtful by Mr. Alston, P. Z. S., 1877, p. 274.

<sup>3</sup> *Taxidea leucura*, Hodgs., J. A. S. B., 1847, xvi, p. 763, Pl. XXIX, XXX, XXXI: *Meles leucurus*, Gray, Cat. Carn. &c. Mam. B. M., 1869, p. 126.

<sup>4</sup> Milne-Edwards, Recherches pour servir à l'Histoire Naturelle des Mammifères, p. 190, Pl. XXV.

<sup>5</sup> Temm. et Schleg., Fauna Japon., Mam., p. 30, Pl. VI.

in being much greyer, whilst from *M. albogularis*<sup>1</sup> it may be at once distinguished by wanting the white throat. Another form found in Eastern Tibet has been described by A. Milne-Edwards under the name of *Meles obscurus*;<sup>2</sup> but it belongs to the genus or sub-genus *Arctonyx*, and the general colouration of this genus diverges considerably from that of the typical badgers.

Judging from the size of the Káshghar skin, it probably belonged to a rather smaller animal than *M. taxus*, and the fur is apparently rather softer. The colour is very similar; the hairs on the back being about  $2\frac{1}{2}$  inches long, white at the base, with a brownish tinge towards the extremity; near the end they are black for about half an inch, the point being white, tail hairs the same, but rather longer, (about 3 inches at the end of the tail,) and with the black ring and white tips more developed; the middle of the forehead and nose brownish white; the brownish-black marks on each side from the nose, enclosing the eyes and ears, meet on the forehead rather in front of the ears, which are white anteriorly, black behind and inside; cheeks white, with a slight brownish tinge; lower parts and limbs black, except the inside of the thigh, which appears to have been white. Only the skin of the upper part of the hind limbs has been preserved.

Length of skin, 3 feet 2 inches, of which the tail measures 8·5 inches, and the hair at the end of the tail 3 inches.

In Western Turkestan, according to Severtzoff, *Meles taxus* is found.

18. *MARTES LEUCOLACHNÆA*, sp. nov.,  
or *Martes foina*, var. *leucolachnæa*.

*M. foina*? J. A. S. B., 1875, xlii, Part 2, p. 106.  
Sausar, Turki of Yárkand.

*M. magnitudine coloreque ad M. foinam proxime accedens, sed vellere multo molliore, lanugine albescente, distinguenda.*

1, skin, without skull, purchased at Yárkand.

This skin is dark sepia-brown in colour, the feet and tail being nearly black. On the throat and breast is a large white patch in the form of an irregular horse-shoe, the convexity directed forward, and each of the lateral extremities extending back beneath the fore arm. The belly is of the same colour as the back. The face is a little paler, being rather earthy brown, palest on the cheeks; the chin the same colour as the head. The ears have short white hairs along the margin, and longer greyish brown hairs inside. Whiskers black.

The fur is very fine and soft, consisting of long glossy dark brown piles, nearly 2 inches long in the middle of the back, and fine woolly under-fur, nearly white, but with a very faint ashy tinge, and rather more than an inch in length: the whitish colour shows distinctly throughout the body through the rather sparse longer hairs. The hair on the tail is blackish and very long.

The soles of the feet are principally covered with short hair, but there are naked pads to the toes, and a larger naked tri-lobed pad on the anterior part of the sole. There is also a small

<sup>1</sup> Blyth, J. A. S. B., xxii, 1853, p. 590.

<sup>2</sup> Recherches Mam., p. 338, Pl. LXII.

naked pad on the posterior portion of the fore feet (palma), only seen on turning up the hair. The pads are surrounded by short blackish hair; the claws are white.

The length of the skin (doubtless somewhat stretched) is 18 inches from nose to insertion of tail; tail  $12\frac{1}{2}$  to the end of the longest hairs, which project  $3\frac{1}{2}$  inches beyond the end of the tail proper.

A second skin, doubtless from the same species of marten, has since been brought from Eastern Turkestan by Dr. Scully, and presented to the Indian Museum. The fur is not so long, and the under-fur is not quite so white, being very pale ashy grey, but in all essential respects this skin agrees with that procured by Dr. Stoliczka, and it has the advantage that the skull, tail and limb-bones are left in the skin. On the label this specimen is marked from Sarikol, and there can be little, if any, doubt that the animal had been kept in captivity. That it was procured alive, or freshly killed, by Dr. Scully, is shown by his having recorded the weight and measurements. The skull is not quite adult, and has been somewhat injured, but still it is nearly, if not quite, full grown. The dimensions marked on the label are:—length 28 inches, tail 11.3. The skin measures now from nose to insertion of tail 18 inches, tail 11, of which  $2\frac{1}{4}$  consist of hairs beyond the end; hind foot and tarsus from heel (a little contracted) 3 inches. The weight is recorded as 1 lb  $10\frac{1}{4}$  oz.

There are also several marten skins in the Indian Museum, purchased from a Kabul merchant, who said they came from Bokhara. These skins have the same dark sepia-brown or blackish brown colour, white throat, glossy piles, and soft whitish under-fur as the Turkestan skins. A marten skull from Afghanistan, in the same collection, much resembles that taken from the skin brought by Dr. Scully. The form of the zygomata is, however, somewhat different.

In the list of Dr. Stoliczka's collections, published in 1875, this Yarkand marten-skin was assigned, with doubts, to *M. foina*, the European beech-marten. I had then no skin of that animal for comparison. I have since received both a skin and a skeleton from Dr. Peters, and another skin has been obtained by the Indian Museum. The conclusion to which I come is, that the Yarkand skins represent a different but nearly allied form. They agree with *M. foina* in having a white throat, and there is but little difference in colour, but the fur in the Asiatic form is longer, softer, and more glossy, and the under-fur much paler, being nearly white instead of brownish-grey. The fur of one of the Yarkand skins is almost equal in beauty and softness to that of the sable.

The skull of *M. leucolachnæa* approaches that of *M. foina* in type, and differs from that of *M. abietum*, being much broader than the latter, with a wider muzzle and less rounded outline above. The permanent pre-molars are not fully grown, and the third upper pre-molar on each side is but just appearing through the jaw. The hinder molars resemble those of *M. foina* more than those of *M. abietum*. Blasius<sup>1</sup> points out that the third upper pre-molar in *M. abietum* is concave outside; that the length of the fourth or flesh-tooth along the external margin equals the transverse diameter of the hindermost or tubercular molar, and the outer margin of the latter is attenuate and not incurved; whereas in *M. foina* the third tooth is convex externally, the length of the fourth exceeds the breadth of the fifth, and the outer margin of the hindmost tooth is incurved and bi-lobed<sup>2</sup> (*eingebuchtet, zweiklappig*). In the

<sup>1</sup> Säugth, Deutsehl., p. 212. See also, on the distinctions between *M. abietum* and *M. foina*, Hensel, Wiegmann's Archiv, 1853, p. 17.

<sup>2</sup> In the only skulls of *M. abietum* and *M. foina* (one of each) that I have at present for comparison, the proportion of the fourth to the fifth upper molar is as stated by Blasius. The other distinctions are less characteristic, and probably vary somewhat.

skull from Eastern Turkestan the length of the flesh-tooth exceeds the breadth of the hinder molar, but the latter is scarcely concave on its outer edge ; and in its general form, especially in its inner portion considerably exceeding the outer portion in antero-posterior diameter, it approaches *M. abietum*.

The following are the dimensions of this skull (*a*). As the animal is not quite mature, the length of the adult skull would be rather more :—

	(a) Inches.	(b) Inches.	(c) Inches.	(d) Inches.
Length from occipital plane to end of premaxillaries	3.15	3.2	3.3	3.15
Breadth across hinder part of zygomatic arches	1.85	1.95	2.05	1.82
„ behind post-orbital processes	0.82	0.71	0.77	0.75
„ of brain-pan at posterior termination of zygomatic processes of squamosals	1.45	1.47	1.45	1.39
Length of upper flesh-tooth along outer edge	0.37	0.36	0.38	0.34
Breadth of upper hinder molar	0.32	0.33	0.32	0.31
Length of mandible from angle to symphysis	1.95	2.05	2.15	1.93
Height of ditto	0.85	0.88	0.9	0.9

It should be repeated that this is the skull of an animal that has in all probability been kept in confinement. Some of the bones are injured, the injuries having apparently been produced during life.

The measurements marked (*b*) are those of the skull from Cabul already mentioned. The teeth resemble those in the Turkestan skull. To the measurement (*c*) I shall revert presently. Those under (*d*) are of a European skull of *M. foina*.

The differences from *M. foina* have been already pointed out, but there are two Asiatic martens to which the present form is allied, and it is as well to show why it does not appear to belong to either. Both, it should be premised, have been very imperfectly described.

The first, to which I was for some time inclined to refer this animal, is *M. toufæa*, Hodgson.<sup>1</sup> This is described from imperfect skins, brought from Tibet, without tails or skulls. The fur is said to be rich and soft, the "general colour smoky-brown, darker along the spine and on the limbs, but without marks, and paled to sordid yellowish hoary on the neck and head ; head palest, except the mystaceal region and chin, which are embrowned ; moustache moderate and dark brown. There are no rings on the inner or outer piles, which have both the smoky-brown hue of the exterior, only paler at the roots."

The last character appears to distinguish *M. toufæa* from the Turkestan marten, in which the very much paler colour of the underfur is a conspicuous character. I possess a specimen of a marten procured by Mr. Mandelli from Sikkim, and probably brought from Tibet. This marten agrees with Mr. Hodgson's description in the colouration of the fur, but it has the whole of the chin and breast white, whilst the chin in *M. toufæa* is said to be embrowned, and no mention is made of white on the throat or breast. The middle of the back, too, is not darker, as it is said to be in Mr. Hodgson's description.

In the Indian Museum are three stuffed specimens received from the Asiatic Society's collection, and identified with *M. toufæa* by Mr. Blyth.<sup>2</sup> They are labelled Tibet, and were presented by Mr. G. T. Lushington in 1845. As Mr. Lushington lived at Almora, it is almost certain that these skins came from Western Tibet. They are very light brown in colour on the head and body, the feet and tails being dark brown. The underfur is pink ; it may perhaps

<sup>1</sup> J. A. S. B., 1842, xi, p. 281.

<sup>2</sup> Cat. Mam. Mus. As. Soc., No. 194, p. 66.

have been slate-coloured originally, and have faded. The white breast extends to the fore-legs, and covers the whole breast and throat.

A skull extracted from one of these skins afforded the measurements marked (c) in the preceding table. This differs from the Turkestan skull more than the Cabul specimen does, being much broader across the zygomatic arches, and having a more convex frontal region.

The second Asiatic species referred to above is *M. intermedia*, of Severtzoff.<sup>1</sup> This name is given to specimens said to be intermediate in character between *M. abietum* and *M. foina*; the only intermediate character specified, however, is the colour of the throat. Severtzoff mentions some skins shown to him as "Kashgar sable," with peculiarly fine fur, and these may, perhaps, have been the same as the Eastern Turkestan species; but the underfur is said to have been darker than in Western Turkestan skins of *M. abietum* and *M. foina*, and the tail shorter, in this approaching the sable. In neither character do the specimens from Eastern Turkestan obtained by Drs. Stoliczka and Scully, nor the supposed Bokhara (or Cabul) skins in the Indian Museum agree with Severtzoff's descriptions.

Altogether I can only conclude that the marten of Eastern Turkestan is a race just distinguishable from *M. foina*, and that *M. intermedia* and *M. toufæa* are probably other races. Whether such forms should be considered specifically distinct or merely varieties is a difficult question, depending rather on convenience than facts. The present form can be either classed as *Martes leucolachnea*, a sub-species or race of *M. foina*, or as *M. foina* var. Probably the martens, like the cats, comprise a large number of incipient species, imperfectly differentiated. This is Severtzoff's view also.

According to Pallas,<sup>2</sup> *M. foina* is only found in the extreme west of Siberia, but Severtzoff includes it in the fauna of Western Turkestan, and Père David obtained it in Northern China,<sup>3</sup> so that the occurrence of a variety in Eastern Turkestan is highly probable.

Skins of *M. abietum* are said by Dr. Leith Adams<sup>4</sup> to be brought from Afghanistan, and sold in the bazaar of Peshawar; but it is not improbable that pale skins of *M. leucolachnea* or *M. intermedia* may have been taken for those of the pine-marten, and specimens bought in a bazaar may be brought from a great distance, so that the purchase of these skins in Ladak and Yarkand by no means prove that they inhabit the country. *M. abietum* is not recorded amongst the Chinese mammals by Père David.

#### 19. MARTES TOUFÆA ?

Hodgson, J. A. S. B., 1842, XI, p. 281.

1, 2, skins (without skulls, and one without feet) purchased at Leh.

At first I was disposed to consider these two skins merely specimens of the last, killed in summer; but there is a considerable difference in the fur, both in colouration and texture, and the feet of the present species have the soles more completely covered with hair, the pads left being very small. The colour is much paler, although the underfur is darker, the fur is shorter and much less glossy, and the white of the throat more extended.

The general colour is rather pale sepia-brown with a greyish tinge (almost earthy-brown) throughout the body, the underfur towards the ends being the same colour as the longer piles,

<sup>1</sup> Turk. Jev., pp. 61, 80; Ann. Mag. Nat. Hist., 1876, Ser. 4, Vol. xviii, p. 46.

<sup>2</sup> Zoog. Ros. As., i, p. 87.

<sup>3</sup> Nouv. Arch. du. Mus., vii, Bulletin, p. 92.

<sup>4</sup> P. Z. S., 1858, p. 517. Since the above was in print, I have received a skin of *M. leucolachnea* from Major St. John. This skin came from Hazara.

and pale ashy grey elsewhere. Face the same colour as the back; ears with short white hairs round their margins, brown outside, brownish white within; feet and tail dark sepia-brown, the hair on the latter longer than on the back; soles of feet hairy, except on the small pads. Whole throat and breast, with the chin and upper lip close to the gape, white, except two or three brown spots in the middle of the throat; fur very soft, the longer hairs in the middle of the back nearly  $1\frac{1}{2}$  inches long; woolly underfur about  $1\frac{1}{8}$  inches in length. In the stretched skin the head and body measure about 15 to 18 inches, tail 9; hairs at end  $3\frac{1}{2}$ ; total 30 inches.

Mention was made in the preceding notes on *Martes leucolachnæa* of a specimen from Sikkim (and probably brought from Tibet) that agreed somewhat in colouration with the description of *M. toufæa*. This skin resembles that from Leh so closely that, so far as species of martens can be determined by the skin alone, I have but little hesitation in considering both the same; both have the same amount of white on the breast, extending to the fore legs in one direction, and to the chin in the other, or much further than in *M. leucolachnæa*; but this character is very probably variable.

The skull of this Eastern Tibetan specimen is imperfect, only the anterior portion having been preserved in the skin. This part, however, despite a considerable resemblance to that of the other skulls from Central Asia noticed under *M. leucolachnæa*, is distinguished by being considerably smaller in size with much smaller teeth. The teeth and the sutures show the animal to have been adult, and even aged. The breadth across the zygomatic arches is 1.8 inches, and behind the post-orbital processes 0.7. The length of the penultimate upper molar or flesh-tooth is 0.31, and the breadth of the last or tubercular molar 0.3. The nearest approach in form is made by the skull from Western Tibet, the measurements of which are given under (c.) on p. 28 and both have the same characteristic convexity of the frontal region between the orbits, so that it is possible that the differences in size, both of the skull and teeth, may be sexual. The colouration of the skins is, however, widely different.

#### 20. MUSTELA STOLICZKANA. Pl. I a, fig 3, and Pl. II b.

W. Blanf., J. A. S. B., 1877, xlvi, Part 2, p. 260.  
Agha Makan, Turki of Yarkand.

Mustela ad M. vulgarem proxime accedens, sed valde major, superne fusco-arenaria, subitus albida, caudâ longiore, quartem partem totius longitudinis subæquante, cum dorso concolore; labris ambobus genisque inferioribus albis, maculâ utrinque post angulam oris fulvâ, alterâque ante oculum utrumque albâ, palmis plantisque confertim pilis indutis. Long. tota cum caudâ 12.2, caudæ, pilis inclusis, 3, cranii 1.8, pedis posterioris a calcaneo 1.4 poll. Angl.

1, dried skin purchased at Yarkand.

Colour pale sandy-brown above, the hairs rather paler and whitish at the base, white below. Fur short, dense and soft. Tail throughout the same colour as the back. There is a small white spot close to the anterior angle of each eye, and a rather larger sandy-brown spot a little behind the gape in the lower part of the cheeks, which are white to within a short distance below the eye. Upper whiskers dark brown towards the base, and of about

the same length as the head. Fore feet white, mixed with pale brown above, hind feet only whitish at the edges; soles of all the feet thickly clad, only the toe-pads being naked, and even they are almost concealed by the long hair. Tail nearly cylindrical, about one-third the length of the head and body.

The whole length, measured by Dr. Scully when the animal was fresh, and noted on the ticket, was 12·2 inches, the tail, of which the vertebræ are preserved, now measures 3 inches including the hair at the end, or 2·3 without it. The hindfoot and tarsus are 1·4 inches long without the claws. Fur on the back about 0·3 inches long. The weight marked by Dr. Scully on the label was 5·2 oz.<sup>1</sup>

The skull is slightly imperfect behind, the occipital plane having been cut away; but as the occipital crest remains, the total length can be measured with close approximation. The cranium shows the specimen to have been just adult, the dentition being perfect, although the sagittal crest is only rudimentary. The following are the dimensions:—

	Metre.	Inches.
Length of skull (approximate) from occipital plane to alveolar margin	.0425	1·75
Breadth of brain-case across parietal region	.021	0·83
Ditto across zygomatic arches	.024	0·98
Ditto behind post-orbital processes	.01	0·4
Length of suture between nasal bones	.007	0·28
Length of bony palate from anterior alveolar margin to the opening of the posterior nares	.0185	0·75
Length of carnassial tooth along outer edge	.005	0·2
Breadth of tubercular (hinder) molar	.0038	0·15
Breadth of bony palate between hinder molars	.0075	0·3
Length of lower jaw from condyle to symphysis	.025	1·
Height of same from coronoid process	.0125	0·5

Amongst the collections brought by Dr. Stoliczka from Eastern Turkestan was the skin of a weasel which had been kept in confinement. Judging from the skin alone, the animal appeared chiefly to differ from the common European weasel in colour, and it was difficult to say how far this difference was due to the circumstances under which the individual had been kept. Although I strongly suspected that it was a distinct species, still I thought it safer not to form conclusions from a single skin, and in the list of species, (J. A. S. B., 1875, Vol. lxiv, Pt. 2, p. 106,) I noted the specimen as *Mustela vulgaris*? var.

A year later, Dr. Scully brought from Turkestan another skin of the same weasel, but the second specimen had belonged to a male wild individual. This skin was also entrusted to me, together with some other interesting specimens, for description. On comparing this second specimen more carefully with *M. vulgaris*, I found that it differed, not only in colour, but in size, being a much larger animal. The length measured on the fresh carcase by Dr. Scully shows that the Yarkand weasel is nearly as large as an ermine, whilst the tail, the vertebræ of which are for the most part preserved, appears to be proportionally longer than in the common weasel. The weight and some other details are also carefully recorded on the label.

<sup>1</sup> The weight of the common weasel, according to Pallas, Zoog. Ros. As., i, p. 98, is only 2 ounces and a drachm in the largest individuals, 1½ oz. in smaller animals, chiefly females.

## 21. MUSTELA TEMON?

Hodgson, J. A. S. B., 1857, xxvi, p. 207.

There is in the Indian Museum a specimen of a *Mustela*, brought by Dr. Henderson from the first Yarkand expedition. It was obtained just north of the Sánju Pass in Yarkand (Lahore to Yarkand, p. 99), and appears to have been identified by somebody with *M. temon*, Hodgs., for it is labelled with that name. Unfortunately this skin has been mounted and exposed to the light, so that it is difficult to say how far time may have altered the original colour. There is no skull, and it is impossible to say if the specimen is adult.

In general form this skin agrees with *M. temon*, but is decidedly smaller. The tail is about  $\frac{2}{3}$  the length of the body and head, and throughout of the same colour as the back, light brown, or, as Hodgson well expresses it, brunnescence fawn, but the lower parts are white, not yellow; and I can detect no canescent tinge on the chin and limbs. The upper lip is whitish, the whiskers dark brown (they may have been black originally), the soles of the feet covered with longish hair.

Compared with a skin of *M. temon* from Sikkim, for which I am indebted to Mr. Mandelli, this specimen is much paler; and if it be adult, the difference in size alone would show it to be distinct. The tail also appears proportionally longer. It is, however, by no means impossible that the Sánju skin may have belonged to a young specimen of *M. temon*, and the pale colour may be due to the drier climate. At the same time I am inclined to believe that a distinct species is indicated.

## 22. MUSTELA ERMINEA.

Linn., Syst. Nat., i, p. 68.

In the Indian Museum there is a specimen of the ermine brought by Dr. Henderson from the first Yarkand expedition. It is probably that which Dr. Henderson mentions his having shot near Drás, west of Ladák.<sup>1</sup>

## 23. LUTRA, SP.

In Dr. Stoliczka's diary for the 28th—31st August, written at Leh, he mentions the occurrence of a small species of *Lutra* in the Indus, and states that he could not procure a specimen.

A skin obtained by Captain Biddulph in Gilgit has since been presented by him to the Indian Museum. Unfortunately the skull is wanting, and the determination of species of otter from the skin alone is almost impossible. The skin, too, is that of a large, not of a small otter, and it is quite possible that a different species from that occurring near Gilgit may be found at Leh. No difference can be traced between the Gilgit skin and that of the common European otter, with which Mr. Blyth<sup>2</sup> identified a Himalayan form, referred at one time to *L. monticola*, Hodgson.

<sup>1</sup> Lahore to Yarkand, p. 42.<sup>2</sup> Cat. Mam. Mus. As. Soc., p. 73.

The upper parts in the Gilgit skin are brown, the long hairs being pale towards the tips; the woolly under-fur is white at the base, rich brown towards the ends. The naked patch on the muzzle, between the nostrils, is produced into an obtuse point in the middle below; above it is higher in the middle and over each nostril, and has a concave margin between. Length of head and body 34, tail 17·8: these measurements being those of a dried skin are of course of small value.

Prejevalski notices the occurrence of an otter, which he calls *Lutra vulgaris*, on all lakes containing fish in abundance in the neighbourhood of Lob-nor.

Family—*URSIDÆ*.

24. *URSUS*, sp.

Although the circumstance is not mentioned in Dr. Stoliczka's diary, I am informed by both Captain Biddulph and Captain Trotter that traces of bears were seen on the Pámir. The species here occurring may very possibly be the pale-coloured form described by Severtzoff as inhabiting the Thian Shan, and named by him *U. leuconyx*.<sup>1</sup> It is doubtful whether this form is identical with the Himalayan *U. isabellinus*, or whether it is a pale *U. arctos*, as *U. isabellinus* itself is thought to be by some naturalists. Between the Himalayan area and the Pámir there is a broad tract in the Indus valley in which no bears are known to occur.

According to Prejevalski<sup>2</sup> there are two different kinds of bears on the Thian Shan, the one dark brown, with white claws, supposed to be *U. leuconyx*, the other a much paler animal, found only on high, treeless plateaux, and identified by Prejevalski with *U. isabellinus*. Apparently no comparison of these forms, by means of skulls, has been made, and the colouration may vary with the locality.

Order RODENTIA.

Family—*SCIURIDÆ*.

25. *PTEROMYS INORNATUS*.

Geoffr., Jacquemont, Voyage dans l'Inde, iv, Zoologie, Mammifères, p. 62; Atlas, ii, Pl. IV.

1, Sonamarg, Kashmir.

The original figure of this species differs much in colouration from all specimens that I have seen, being much too pale, and showing nothing of the grizzled back.

26. *ARCTOMYS AUREUS*. Pls. XI, XIa.

<sup>1</sup> W. Blanf. J. A. S. B., 1875, xliv, Pt. 2, pp. 106, 123.

<sup>2</sup> *A. caudatus*, Severtzoff, Turk. Jev., pp. 61, 81; Ann. Mag. Nat. Hist., July, 1876, Ser. 4, Vol. xviii, p. 50, *nec* Jacquemont.

*A. aureo-fulvus, dorso nigro lavato, capite antice fulvescenti-cano, maculo fusco ad rostri extremitatem signato, ventre interdum leviter ferruginescente, caudâ tertiam partem*

<sup>1</sup> Turk. Jev. p. 80; Ann. Mag. Nat. Hist., July 1876, Ser. 4, Vol. xviii, p. 43.

<sup>2</sup> Pet. Mitth. Erg. hft., No. 53, p. 3: From Kulja, &c., p. 38.

*corporis capitisque æquante, fulvâ, nigro breviter terminatâ; pilis elongatis corporis omnibus ad basin fuscis. Long. a rostro ad basin caudæ circiter 18 (in corio dessiccato), caudæ vertebrarum 6, palmæ 2, plantæ fere 3, crani 3.7 poll.*

1, 2, 3, skins; 4, 5, skulls, Kaskasu pass, 13,000 feet high, on the road from Kâshghar to Sarikol and the Pâmir.

General colour tawny to rich brownish yellow, the dorsal portion conspicuously tinged with black from all the hairs having black tips, but these are far more conspicuous in some specimens (? males) than in others; face grey to blackish with a rufous tinge, covered with black and whitish hairs mixed, about half an inch long on the forehead. The black hairs on the face are more prevalent in those specimens (perhaps males) which have the blackest backs; the middle of the forehead is, in some cases, more fulvous. On the end of the nose is a blackish-brown patch, and there is a narrow band of black hairs with a few white mixed round the lips; the sides of the nose are paler; whiskers black. Hairs of the back  $1\frac{1}{4}$  to  $1\frac{1}{2}$  inches long, much mixed with woolly fibres, dark slaty at the extreme base for about  $\frac{1}{4}$  inch, then pale straw colour, becoming deeper golden-yellow towards the extremity, the end black. In the blackest specimens the black tips are wanting on the posterior portion of the back. Tail yellow, the same colour as the rump, except the tip, which is black for a length varying from an inch to about  $2\frac{1}{2}$  inches (in 3 specimens out of 4 it does not exceed an inch); hairs of the tail about 2 inches long, brown at the base. Lower parts rather browner and sometimes with a rufous wash, the hairs shorter and thinner, chocolate brown at the base, without the short woolly underfur, which is very thick on the back. Feet above yellowish tawny like the sides.

The lengths measured on the dried skins are—

Nose to insertion of tail . . . . .	$16\frac{1}{2}$ to $18\frac{1}{2}$ inches.
Tail . . . . .	5 to $6\frac{1}{2}$ "
Hairs at the end . . . . .	$1\frac{1}{2}$ to $1\frac{3}{4}$ "
Fore-foot (palma) measured to the end of the toes, but not including the claws . . . . .	2.1
Middle toe without claw measured below . . . . .	0.8
Claw measured above . . . . .	0.6
Hind-foot (planta) similarly measured . . . . .	2.9
Mid toe without claw . . . . .	0.8
Claw . . . . .	0.52

This is a much smaller species than *A. caudatus*; the tail is rather shorter in proportion, and is paler in colour, with less black at the end. The animal is also distinguished by the absence of the ferruginous tinge on the legs, and the underparts generally are much less rufous. It is a very different species from *A. himalayanus* (*A. bobac* of several authors), being smaller, much more yellow and less grey in colour, with a longer tail.

Of all the Himalayan species it agrees best with *A. hemachalanus*, Hodgson, but the latter is a yet smaller form with shorter tail, shorter hair, and different in colour, being described as "dark-grey with a full rufous tinge, which is rusty and almost ochreous red on the sides of the head, ears, and limbs." Now *A. aureus* cannot be called dark-grey, and in the specimens obtained the ferruginous tint is confined to the abdomen. The skin and skeleton of a marmot from Sikkim in the old Asiatic Society's collection (*C, Ca*, of the list in Blyth's catalogue) belong, I believe, to *A. hemachalanus*. The skull differs widely from that of *aureus*, being smaller and much shorter in proportion to its length, besides numerous minor

differences. The skin too differs much in colour, being far greyer, and the tail is considerably shorter. Some other specimens have since been obtained in Calcutta, and I have seen a living animal in captivity at Darjiling. Singularly enough, out of 6 specimens known to me, and 4 that I have personally examined, not one was wild,—all had been kept in confinement. Still as all agree well in characters, there can be no question that the species is well marked and distinct.<sup>1</sup>

*A. baibacinus*, Brandt, is a very much smaller animal, the skull measuring only 43 millemetres,<sup>2</sup> and it has a short tail like *A. himalayanus*, not more than a quarter the length of the body.

The skull of *A. aureus*, though very much smaller, approaches that of *A. caudatus* more nearly than any of the other Himalayan marmots. The zygomatic arch in the latter, however, is nearly twice as deep and convex below, whilst that in *A. aureus* is nearly straight, and the nasal bones are broader behind in *A. caudatus*. The pterygoids are very differently shaped in the two species. The following are the dimensions of an adult skull of *A. aureus* :—

	Metre.	Inches.
Length from occipital plane to anterior end of nasals . . . . .	.094	3·7
Breadth across widest part of zygomatic arches . . . . .	.057	2·25
Do. behind postorbital processes . . . . .	.017	0·65
Length of nasal bones . . . . .	.038	1·5
Breadth of do. in front . . . . .	.0165	0·64
Do. do. behind . . . . .	.0105	0·42
Length of molars in upper jaw taken together . . . . .	.020	0·82
Length of lower jaw from angle to symphysis . . . . .	.066	2·6
Height of do. at coronoid process . . . . .	.035	1·4

I learn from Captain Trotter that *A. aureus* was seen abundantly on the return journey from the Pámir to Yárkand in May about the Kaskasu and Torat passes, at an elevation of 11,000 to 13,000 feet. On the outward journey towards the end of March, none had yet come out of their holes.

The species identified with *A. caudatus* by Severtzoff can, I think, scarcely be that species, and the very few characters given agree with *A. aureus*. The animal is said to have been “yellow with fine black, longer hair, the head was darker and blackish.” Length from the tip of the nose to the root of the tail 14 inches 2 lines, tail 8 inches 5 lines. This is

<sup>1</sup> For a dissertation on the species of marmot inhabiting the Himalaya, Tibet, and adjoining regions, see J. A. S. B., 1875, vol. xliv, Pt. 2, p. 113. I have there shown that independently of *A. aureus*, and of *A. dichrous* (Anderson, Ann. Mag. Nat. Hist., October, 1875, Ser. 4, vol. xvi, p. 283, three species inhabit the Himalayas or Tibet, viz., *A. caudatus*, *A. himalayanus*, and *A. hemachalanus*. Dr. Sclater has since pointed out to me that the two last names are, in fact, identical, and that consequently one must be changed. I would gladly retain *A. hemachalanus* and alter *A. himalayanus*, as was proposed by Hodgson himself, to *A. tibetensis*; but I fear this would be opposed to the laws of nomenclature, as *A. himalayanus* was the name first given, and moreover it would lead to confusion, for the name *A. tibetanus* has been adopted in the British Museum for *A. hemachalanus*. On the other hand, to follow the British Museum nomenclature would be ridiculous, for *A. himalayanus* is the Tibetan species, and is the original *tibetensis* of Hodgson, not *A. hemachalanus*. Under these circumstances, I see no other resource than to propose a new name for *A. hemachalanus*, and I think it should be called after its discoverer. The synonymy would then stand thus:

A. HODGSONI.

*A. hemachalanus*, Hodgson, J. A. S. B., 1843, xii, p. 410.

“*A. tibetanus* Hodgs.” Gray, Cat. Mam. Birds Nepal, p. 24 (1846); 2nd edition, p. 12, (1863), *nec A. tibetensis*, Hodgs. J. A. S. B., 1843, xii, p. 409.

“*A. bobac*, Schreb.” partim, Blyth, Cat. Mam. Mus. As. Soc., p. 108 (1863), *nec Schreber*.

“*A. hemachalanus*, Hodgson,” Jerdon, Mam. Ind., p. 182 (1867). W. Blauff., J. A. S. B., 1875, xliv, Pt. 2, p. 122.

<sup>2</sup> A. Milne Edwards, Rech. Mam., p. 312.

far too small for *A. caudatus*. The locality whence Severtzoff's only specimen, since lost, was procured, was "south of the Aulje-ata, in the mountain chains between Tallas and Chirchik." This is north of Khokand and about 350 miles north-west of the Kaskasu pass, which again is at least 200 miles north of any place known to be inhabited by *A. caudatus*.

*Arctomys dichrous*,<sup>1</sup> from the mountains of Cabul, is a very different species from *A. aureus*, being much less yellow, without any black on the back, and having the upper parts pale dull tawny and the lower parts rufous brown. It appears also to be a smaller animal. In the Indian Museum there is a skull of a marmot,<sup>2</sup> brought by Sir A. Burnes from Cabul, and much resembling that of *A. aureus*. It is however distinguished by being broader across the zygomatic arches, by having much broader and differently shaped nasal bones, and by a few other differences. This skull may perhaps have belonged to an adult of *A. dichrous*, the typical specimens of which are immature, but it is impossible to determine this; the nasal bones are similar, but the skull of *A. dichrous* appears longer in proportion to the breadth, besides being very much smaller, although all the molars are through the jaw.

## 27. ARCTOMYS HIMALAYANUS. Pls. XII, XIIa.

Hodgson, J. A. S. B., 1841, x, p. 777.—W. Blanford, J. A. S. B., 1875, xliv, p. 121.  
*A. himalayanus*, potius *tibetensis*, Hodgs., J. A. S. B., 1843, xii, p. 409.  
 " *A. bobac*, Schreb.," partim, Gray, List Spec. Mam. Coll. B. M., 1843, p. 148.—Horsfield, Cat. Mam. I. H. Mus., p. 164 (1851).—Blyth, Cat. Mam. Mus. As. Soc., p. 108 (1863).—Jerdon, Mam. Ind., p. 181 (1867).—Anderson, P. Z. S., 1871, p. 560.—*nec* Schreber.  
*A. tataricus*, Jameson,<sup>3</sup> L'Instit. 1847, xv., p. 384.  
 " *A. tibetanus*, Hodgson," Fitzinger, Sitzb. k. k. Akad. Wiss. Wien., 1867, lv, i, p. 491.—Adams, P. Z. S., 1858, p. 521.  
*A. robustus*, A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., vii, Bulletin, p. 92, (1870).  
 Recherches Mamm., i, p. 309, Pl. XLVII, XLIX, fig. 2.  
 "? *A. baibacinus*, Brandt," Severtzoff, Turk. Jev., p. 61, *nec* Brandt, teste Severtzoff, J. A. S. B., 1875, xliv, Pt. 2, p. 126; Ann. Mag. N. H., July, 1876, Ser. 4, xviii, p. 50, note.

Of this marmot no specimens were procured by Dr. Stoliczka during his last expedition, but I have examined the three brought from the Sánju pass in the Kuenlun range, south of Yárkand, by Dr. Henderson, and described by Dr. Anderson in the Proceedings of the Zoological Society, *l. c.* So far as I am able to judge, I quite concur with Dr. Anderson in assigning them to the species originally described by Hodgson from Tibet, and which was referred by Gray, Blyth, Anderson, and other writers, to *A. bobac*. It is, however, a much larger species than the *Bobac*.

I have already entered into the confused synonymy of this Himalayan and Tibetan marmot in the Journal of the Asiatic Society of Bengal (*l. c.*), and need not recapitulate further than to point out that the species is probably the *A. tartaricus* of Jameson, the description of which I have been unable to consult, and the *A. robustus* of M. Milne Edwards from Eastern Tibet. The latter species, as figured in the "Recherches," appears

<sup>1</sup> Anderson, Ann. and Mag. Nat. Hist., October, 1875, Ser. 4, xvi, p. 283.

<sup>2</sup> One of the specimens referred by Mr. Blyth to *Arctomys bobac* in his Catalogue of the Mammalia in the Museum Asiatic Society, No. 348 E, p. 109.

<sup>3</sup> This reference is quoted from Wiegman's "Archiv," no copy of the work named being available.

much more dark-coloured, but in a footnote attention is called to the fact that the plate has been over-coloured by the draftsman.

By the kindness of Mr. Mandelli of Darjiling, I have been enabled to examine specimens of *A. himalayanus* from the portion of Tibet north of Sikkim. As this locality is at no great distance from Northern Nepal or the adjoining districts in Tibet, whence Mr. Hodgson's types were derived, it may fairly be inferred that Mr. Mandelli's specimens in all probability resemble those originally described. The skins differ but little from those of Sánju; they are a little greyer in tint and darker in the face, but the distinction is trifling, and the dimensions appear similar. The skull of one of Mr. Mandelli's specimens measures 101 millimetres in length by 67 in breadth, and is consequently broader in proportion to its length than the Sánju skull, of which the measurements are given below, and which is figured on Pl. XIIa. The former is also rather less high, and the nasal bones are shorter and more convex. The skull of *A. robustus* again, as figured in the "Recherches," differs from the Sánju specimen in having a narrower frontal region and somewhat narrower and shorter nasals. It is probable that a larger series of these animals would show other cranial distinctions, for marmots live under the most favorable conditions for producing permanent varieties; each colony or group of families being isolated, and frequently at a distance of many miles from the next colony, so that the two, in all probability, rarely, if ever, breed with each other. I am disposed to think that it is most convenient to consider all these short-tailed Tibetan and Kuenlun marmots as varieties of the same species.

Dr. Severtzoff found a marmot in the eastern mountains of Russian Turkestan above an elevation of 4,000 feet, and at first identified the species with the *A. baibacinus* of Brandt from the Altai, but subsequently, in conversation with Mr. Dresser, suggested that the Turkestan form might be *A. robustus* of Milne Edwards. This opinion requires confirmation, no specimens having been compared so far as I know, but should it prove correct, the range of *A. himalayanus* (*A. robustus*) must extend to the Thian Shan or its branches.

In a Sánju specimen of *A. himalayanus*, the ears are barely  $\frac{3}{4}$  inch high from the orifice; the fore-foot (palma) measures 2·5 inches without the nails; the hind-foot (planta) 3·25.

The following are the dimensions of a skull:—

		Met.	Inches.
Length from occipital plane to anterior end of nasal bones	.	.105	4·13
Breadth across widest part of zygomatic arches	.	.066	2·58
Do. behind postorbital processes	.	.0185	0·73
Length of nasal bones	.	.045	1·76
Breadth of do. in front	.	.018	0·7
Do. do. behind	.	.010	0·38
Length of molars in upper jaw taken together	.	.024	0·95
Do. lower jaw from angle to symphysis	.	.068	2·7
Height of do. at coronoid process	.	.043	1·7

Dr. Stoliczka mentions in his diary that *Arctomys bobac* (*A. himalayanus*?) was seen at Rimdi north of the Pangong lake in Ladák.

## 28. ARCTOMYS CAUDATUS. Pls. XIII, XIIIa.

Jacquemont, Voyage dans l'Inde, iv, p. 66, Pl. V.—W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 122.

*A. bobac*, Adams, P. Z. S., 1858, p. 521, *nec* Schreber.

*A. hemachalanus*, Anderson, P. Z. S., 1871, p. 561, *nec* Hodgson.

No specimen of this, the common marmot of Ladák, is included in Dr. Stoliczka's collections, but he had, I believe, obtained specimens in his former journey. I have already

entered at full length into the question of the synonymy of this and other Himalayan marmots in the paper already mentioned, published in the Journal of the Asiatic Society of Bengal,<sup>1</sup> and need only recapitulate my conclusions here without entering into details.

The "red marmot" appears to be the common species of Ladâk, and certainly is that of which the skins are usually obtained in Kashmir, but owing to the manner in which the names of different marmots have been confused by various writers, it is almost impossible to ascertain at present the relative distribution of this species and *A. himalayanus*, the "white marmot" of Adams. Anderson identified skins from Sikkim with a typical specimen which he described from the Zoji-la pass between Kashmir and Drâs. This last specimen I have examined, but the Sikkim specimens are not at present accessible. From a number of enquiries, however, I believe it is highly improbable that *Arctomys caudatus* inhabits the Eastern Himalayas, and if the specimens supposed to be from Sikkim are really *A. caudatus* the locality is almost certainly erroneous.

Jacquemont's type was procured near the Zoji-la, at a place which he calls Gombour or Gombur, close to the head of the Sind valley in Kashmir, but on the opposite watershed, that of the Indus, and in the valley of a stream running into the Drâs river. Dr. Anderson's specimen was procured from probably the same locality by Dr. Henderson when accompanying Mr. Forsyth on his first expedition to Yârkand.<sup>2</sup>

Adams<sup>3</sup> distinguished the present species as the red marmot, which he called *A. bobac* of Schreber.

Blyth<sup>4</sup> referred all the Himalayan marmots to one species, which, following Gray,<sup>5</sup> he also called *A. bobac*, Schreber. Jerdon<sup>6</sup> separated *A. hemachalanus*, Hodgson's long-tailed marmot, and gave as one of the native names *Drun* of Kashmir; but he left the proper name for the Drun, *A. caudatus*, as a synonym of the short-tailed Himalayan marmot, his *A. bobac*. Anderson adopted Jerdon's synonymy. The true *A. hemachalanus* of Hodgson, however, is a much smaller species and differently coloured, so that Jacquemont's name must be preserved for the "red marmot" of Kashmir and Ladâk.

*Arctomys caudatus* is one of the largest species of marmots, being nearly two feet long, exclusive of the tail, which measures, with the hairs at the end, half as much more. The general colour is yellowish tawny, more or less washed with black on the back, and with all the underparts and limbs rusty red. In some specimens (males?) the back is very much blacker than in others, the hairs being dusky or black throughout, whilst other specimens have only the tips of the hairs black. In the specimen brought from the Zoji-la by Dr. Henderson, the fore-foot (palma) measures, without the claws, 2·3 inches, the hind-foot 3·4, and the following are the measurements of the skull:—

		Metre.	Inches.
Length from occipital plane to anterior end of nasal bones	.	·105	4·12
Breadth across widest part of zygomatic arches	.	·066	2·6
Do. behind postorbital processes	.	·016	0·63
Length of nasal bones	.	·042	1·67
Breadth of do. in front	.	·020	0·8
Do. do. behind	.	·017	0·67
Length of molars in upper jaw taken together	.	·0235	0·95
Length of lower jaw from angle to symphysis	.	·074	2·93
Height of do. at coronoid process	.	·041	1·6

<sup>1</sup> Vol. xliv, 1875, Pt. 2, p. 113.

<sup>2</sup> Lahore to Yarkand, p. 38.

<sup>3</sup> P. Z. S. 1858, p. 521.

<sup>4</sup> Cat. Mam. Mus. As. Soc., p. 108.

<sup>5</sup> List Sp. Mam. Col. B. M., p. 148.

<sup>6</sup> Mam. Ind., p. 182.

In his paper on *Lagomys curzoniae* Dr. Stoliczka<sup>1</sup> mentions that a marmot is found up to 17,000 feet in Ladâk. The species was probably *A caudatus*.

Family—*MURIDÆ*.

29. *ARVICOLA BLYTHI*. Pl. VIII, fig. 2, Pl. Xb, fig. 1.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 107.

*Phaiomys leucurus*, Blyth, J. A. S. B., 1863, xxxii, p. 89.—Theobald, J. A. S. B., 1862, xxxi, p. 519; nec *Arvicola leucurus*, Gerbe.

*Arvicola fuscescenti-fulvus subtus isabellinus, caudâ fulvâ, quartam partem totius longitudinis subæquante vel excedente, auribus rotundatis mediocribus, sparsim pilosis, palmis pentadactylis, ungue pollicari parvo obtuso, dentibus molariis similibus iis A: mandarini, molario ultimo maxillari postice magis producto, angulo interno postico ejusdem acutiore, dente anteriore mandibulari antice angulo fortiore interno munito. Long. sine caudâ 4—4.5, caudæ 1.25—1.35, cranii 1, auris 0.4, plantæ 0.8 poll.*

1, 2, 3, (2 skins and one specimen in spirit) Tânkse, 13,000 feet; 4, 5, (one skin and one specimen in spirit) Lukong on the Pankong lake; 6 (skin) unlabelled.

I regret to be obliged to confer a new name upon this vole. I have gone through a mass of literature relating to *Arvicola*, in the hopes of finding grounds for maintaining the genus *Phaiomys*,<sup>2</sup> but I do not think it can be upheld for the reasons given beneath, and if it be, as I believe, identical with *Arvicola*, the name *leucurus* is forestalled.

I will first give a somewhat fuller description of this species and its dentition, and I will then proceed to the question of its general relations.

General colour above yellowish-brown, below pale-isabelline (brownish-white). The fur is soft and rather variable in length; in two specimens (which are apparently acquiring the winter coat) it is about 0.35 inch long on the middle of the back; in two others it is nearly half an inch long and softer; the basal portion throughout, amounting to more than two-thirds of the length on the upper surface, and about one-half on the lower, dark-slaty, uniform in texture; the tips of two kinds—the finer isabelline, the coarser and longer dark-brown, almost black. Upper part of the head the same colour as the back, ears round, of moderate size, thinly clad with pale-brown (isabelline) hairs inside, more thickly and with longer hairs outside. Upper whiskers dark-brown, lower whitish, the longest nearly an inch in length. Feet above the same colour as the abdomen; soles naked; claws compressed, horn-coloured; ungual phalanx short, furnished with a blunt compressed claw. Tail cylindrical, distinctly ringed, covered with short light-brown hair, nearly the same colour as that of the lower parts.

Dr. Stoliczka in his notes gives the following dimensions and particulars.

“ Its length is 4 inches, and the tail 1.35; ears round, very sparsely hairy inside; iris black, with an outer blue ring; nose black; soles pale, fleshy brown.”

One of the specimens in spirit (the two are of precisely the same size) measures:—

	Inches.
Length in a straight line from nose to insertion of tail . . . . .	3.7
Do. of tail . . . . .	1.1
Height of ear from orifice . . . . .	0.33
Breadth of ditto . . . . .	0.37
Do. of fore-foot and claws . . . . .	0.45
Length of tarsus, hind-foot and claws . . . . .	0.82

<sup>1</sup> J. A. S. B. xxxiv, 1865, p. 111.

<sup>2</sup> If the genus be retained, it should be written *Phaiomys*.

These measurements would of course be for the most part rather more in fresh specimens.

The following are the dimensions of a skull :—

		Metre.	Inches.
Length from occipital plane to end of premaxillaries	.. .	.026	1.03
Breadth across zygomatic arches	.. .	.017	0.67
Do. between orbits	.. .	.004	0.15
Length of nasal bones	.. .	.008	0.3
Breadth of ditto in front	.. .	.0035	0.13
Length of upper molars taken together	.. .	.007	0.28
Distance from incisors to upper molars	.. .	.0095	0.38
Length of lower jaw from condyle to symphysis	.. .	.019	0.75

The nasal bones are suddenly constricted at rather less than half their length from the front; thence they continue nearly the same width to the posterior extremity, where they are rounded. The incisors are orange in front, the upper pair sometimes with a very shallow groove down the middle. The anterior molar in the upper jaw consists of five prismatic lobes, and has three salient angles inside and three outside; the second consists of four lobes with two angles inside and three outside; the third of four lobes, the last being irregularly shaped and turned round at the end so as almost to form a fifth, and with three salient angles, the hindmost less prominent, inside, and three outside. In the lower jaw the anterior molar has four salient angles externally, five internally. The second tooth consisting of five prisms has three angles on each side, the third tooth consists of three lobes, and has three projections inside and two very small on the outside.

On one of the labels it is stated that this species lives in holes in grassy places and fields. Stoliczka in his diary mentions finding it in the range north of Kashmir as well as on the Pankong lake. Mr. Theobald's original specimens were from the Tso-moriri,<sup>1</sup> between Spiti and the Pankong lake, and he noticed its abundance on the shores of the lake where he frequently found that its holes "were ranged in a long line against a bank, and usually extended so far, that all attempts to capture an animal by digging or flooding the holes with water proved fruitless." He adds: "After infinite trouble, however, I managed to dig out an adult female, which on examination I found to contain six young ones, the size of horse-beans, three in each horn of the uterus. The total length of this specimen was 6.15 inches, of which the head was 1.3, and the tail 1.25 inches. I subsequently got several more, mostly half grown, by watching near their holes with a gun."

Of the types procured by Mr. Theobald, one, in spirit, was presented to the Asiatic Society's Museum. This, after some search, has been refound by Mr. Theobald himself, and, although the label had been lost, satisfactorily and unmistakably identified. The specimen, although considerably smaller than the female mentioned above, proves to be an adult male. It is precisely similar to the specimens brought by Dr. Stoliczka from the Pankong lake.

Dr. Stoliczka, too, in his account (J. A. S. B., 1865, xxxiv, p. 110,) of the *Lagomys*, which he identified with *L. curzonae*,<sup>2</sup> mentions this species as inhabiting the borders of the Tso-moriri with the *Lagomys* and an *Arctomys*.<sup>3</sup> He says that the *Arvicola* (*Phaiomys*) never frequents a great elevation above the bottom of the valleys, and is especially numerous in the neighbourhood of streams. He adds that it is found in Spiti and Lahoul, and even in Kulu.

<sup>1</sup> Tso, lake in Tibetan, sometimes written Cho, but I believe incorrectly.

<sup>2</sup> *L. ladacensis*. q. v.

<sup>3</sup> Probably *A. caudatus*, Jacquemont, q. v.

Proceeding now to the question of nomenclature, it may be as well, before making any remarks upon it, to quote Mr. Blyth's description *l. c.* in full. It runs as follows:—

PHAIOMYS, nobis, *n. g.* Similar to *Arvicola*, but more robust, with a well-developed thumb and nail to the forefoot; tail shortish and densely clad with short adpressed hairs. Upper rodent tusks inconspicuously grooved.

PH. LEUCURUS, nobis, *n. s.* Length of a female containing six *faetus* 6 $\frac{1}{2}$  inch, of which tail  $\frac{1}{4}$  inch;<sup>1</sup> of a smaller specimen sent 4 $\frac{1}{2}$  inches, of which tail 1 $\frac{1}{4}$  inch, of hind-foot claws (*sic*, probably a misprint for *hind foot with claws*)  $\frac{7}{8}$  inch. Fur dense, very soft, and fine; the surface fine greyish-brown on the upper parts; on the lower parts, feet and tail white, a little sullied; basal two-thirds or more of the upper fur dark slaty. "Ears rounded, of medium size, rather appressed."

It is, I think, evident from the above, that Mr. Blyth based the distinction between his genus *Phaiomys* and *Arvicola* chiefly on the presence in the former of a claw to the rudimentary thumb; neither the general form nor the tail affording any distinctive character of importance. This claw is absent in some species of the genus *Arvicola*, but present, I think, in a still larger number. It is present, for instance, in the common water rat, *A. amphibius*; Pallas mentions its existence in a more or less rudimentary form in *A. socialis*,<sup>2</sup> *A. economus*,<sup>3</sup> *A. gregalis*,<sup>4</sup> *A. rutilus*,<sup>5</sup> and *A. saxatilis*,<sup>6</sup> it being very minute in *A. gregalis* and *A. rutilus*; whilst it is described as absent in *A. alliarius*.<sup>7</sup> Its presence has, moreover, been noted in some Asiatic forms described in more recent works, as *A. amurensis*,<sup>8</sup> *A. maximowiczi*,<sup>9</sup> *A. brandti*,<sup>10</sup> *A. obscurus*,<sup>11</sup> and *A. mandarinus*,<sup>12</sup> and I note, in the first place, that these species belong to very different sections of the genus as distinguished by the characters of the teeth; *A. saxatilis* and *A. brandti*, for instance, having, according to Milne-Edwards,<sup>13</sup> one prism on the inner side of the last upper molars, in addition to those found in *A. obscurus*, *A. mandarinus*,<sup>14</sup> and many other species; secondly, that careful and well-informed observers, with a wide knowledge of the genus, have not considered the presence or absence of a claw on the thumb a character of sufficient importance to justify its being used for generic distinction; and lastly, that there is an almost complete gradation from species wanting the claw to those which have it well developed, through forms in which it is more or less rudimentary.

But if *Phaiomys leucurus* be relegated to the genus *Arvicola*, the name must be changed, as there is an *A. leucurus* of Gerbe,<sup>15</sup> described from the Alps of Provence in

<sup>1</sup> Evidently a misprint for 1 $\frac{1}{4}$ . Theobald gives as the measurement of the total length 6·15 inches, of which the head was 1·30, and the tail 1·25.

<sup>2</sup> Glires, p. 220.

<sup>3</sup> Ib., p. 234.

<sup>4</sup> Ib., p. 244.

<sup>5</sup> Ib., p. 248.

<sup>6</sup> Ib., p. 256.

<sup>7</sup> Ib., p. 253.

<sup>8</sup> Schrenk, Reisen und Forschungen im Amur-Lande, i, p. 129.

<sup>9</sup> Ib., p. 140.

<sup>10</sup> Radde, Reisen im Suden von Ost-Siberien, i, p. 199, Pl. VII, fig. 3.

<sup>11</sup> Eversmann *apud* Middendorff, Sib. Reise, p. 109, Pl. XI, figs. 1—5. Although the presence of the claw is not mentioned in the description, it is clearly shewn in figure 3 representing the skeleton. The original description of the species is in the Addenda ad cel. Pallasii Zoographiam, &c., fasc. 2,—a very rare book.

<sup>12</sup> A. Milne-Edwards, Rech. Mam. p. 129, Pl. XII, XIII.

<sup>13</sup> Rech. Mam., p. 131. I have unfortunately been unable to consult a paper by Blasius on *Arvicola*, in the Münch. Gelerht. Anz., 1853, xxxvii, p. 105, as the volume is deficient in the only set in Calcutta, that belonging to the Asiatic Society.

<sup>14</sup> This character, I may note, appears quite as important as the presence of an additional ridge on the anterior upper molars, on the strength of which Hodgson's genus *Neodon* has been established (Jerdon, Mammals, p. 216). The genus was originally proposed in the Annals and Magazine of Natural History for 1849, Ser. 2, Vol. III, p. 203, but it was not described, and it was merely said to differ from *Arvicola* in the character of the molars. The genus *Neodon* appears founded on characters of only specific importance, and the type, *N. sikkimensis*, is, I think, a true *Arvicola*.

<sup>15</sup> Rev. de Zool., iv, p. 260.

1852. According to Blasius<sup>1</sup> *A. leucurus*, Gerbe, is identical with *A. nivalis*, Martins, (*Hypudæus alpinus*, Wagner), so that those naturalists who do not consider that a name need be altered if the same specific term, given previously, does not stand, may retain Blyth's name for the present species. At the same time it is objectionable, for this vole cannot rightly be said to have a white tail.

There is another species recently described by Severtzoff as *A. leucura*<sup>2</sup> from Western Turkestan; the name of this form, if really distinct, will also, I think, require alteration.

In general colouration and characters, length of tail and form of teeth, *A. blythi* is very near *A. mandarinus*<sup>3</sup> from Chinese Mongolia; but differs in its much larger ears, in the tail not being so dark above, and slightly in the shape of the teeth. In *A. mandarinus* the posterior portion of the last upper molar is shewn to be less developed, and the hindmost inner salient angle much blunter; the anterior inner angle of the first tooth in the lower jaw is also less developed, and all the prisms of that tooth broader and thicker.

The solitary skin referred to *Arvicola roylei* in the Asiatic Society's Museum has been mislaid, and its identification, if it came from Pind Dadun Khan,<sup>4</sup> is very doubtful; but the species was described originally<sup>5</sup> as rufous-grey above and grey beneath; and Jerdon<sup>6</sup> calls it ashy-brown above, pale brownish-ashy below. The second and third lower molars are said to have three equal folds on each side;<sup>7</sup> whilst the hindmost upper molar is described as elongate, narrow, with three slight folds on each side and an elongate lobe behind. I have an *Arvicola* from Murree agreeing with the description of *A. roylei* in external characters; but the posterior upper molar has but two folds on each side. As, however, there may be an error in the original description, I am not sure that the species is really distinct. A species of *Arvicola* has been described by A. Milne-Edwards from Eastern Tibet under the name of *A. melanogaster*.<sup>8</sup> Another species is *Neodon sikkimensis*, the genus *Neodon*, as was pointed out in a note to a preceding page, being founded upon characters of no generic value. This species, though attributed to Hodgson, was never described by him; the genus was announced, but without any definite characters being pointed out, by Horsfield,<sup>9</sup> and it appears to have been first definitely described in Jerdon's Mammals of India.<sup>10</sup>

30. ARVICOLA STOLICZKANUS. Pl. VIII, Fig 1; Pl. X b, Fig 2.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 107.

*A. supra lœte fusco-rufescens, sive sordide ferrugineus, subitus albus; vellere molli, longiusculo, ad basin schistaceo, palmis tetradactylis, plantis pentadactylis nudis brevibus, tarsis subitus pilis indutis, auriculis partis e vellere haud emergentibus, rotundatis, caudâ*

<sup>1</sup> Archiv. f. Naturgesch. 1856, Pt. 1, p. 261.

<sup>2</sup> Turk. Jev. p. 82; Ann. Mag. Nat. Hist., Ser. 4, Vol. xviii, p. 52.

<sup>3</sup> A. Milne-Edwards, Recherches Mamm., i., p. 129, Pl. XII, XIII.

<sup>4</sup> Blyth, Cat. Mam. Mus. As. Soc. p. 125.

<sup>5</sup> Gray, Ann. Mag. Nat. Hist., 1842, x, p. 265.

<sup>6</sup> Mam., p. 216.

<sup>7</sup> Gray, l. c.

<sup>8</sup> Rech. Mamm., p. 284, Pl. XLIV, XLVI a.

<sup>9</sup> Ann. Mag. Nat. Hist., Ser. 2, iii, p. 203.

<sup>10</sup> p. 216.

*quintam partem totius longitudinis subæquante, pilis fulvescenti-albidis setosis instructâ ; dente molario maxillari ultimo angusto, intus angulis duobus fortioribus antice, nullis postice, extus quatuor parvulis, duobus antice, ceteris postice, spatio interveniente, munito. Long. a rostro ad basin caudæ (in corio dessicato) 4, caudæ 1, tarsi 0.7 poll.*

1, Nubra valley, N. of Ladâk ; 2. Aktâgh, on the upper waters of the Yârkand river.

General colour bright ferruginous, brown above, pure white beneath. Fur soft, rather woolly, 0.5 to 0.6 inch long on the middle of the back, the basal portion throughout both head and body being dark leaden-grey : this is the case on the back for about three quarters of the length of the hairs ; the remaining quarter is rufous-white, tipped with darker rufous, whilst numerous rather longer hairs are dark rufous-brown at the ends. Rather a sharp line divides the rufous of the back from the white belly. Upper part of the head the same colour as the back. Upper whiskers dark-brown ; lower, including the longest, white. Ears small, rounded, hairy, completely concealed by the fur, with rather short bright rufous hair near the margin inside, and covered outside with longer and paler hair. Feet small, the thumb of the fore-foot quite rudimentary and clawless ; remaining claws long, compressed, sharply pointed, but much concealed by the long white hairs, which cover the upper part of the foot ; soles naked ; tarsus hairy below, a few hairs between the pads of the toes. Tail short, apparently about a quarter the length of the body and head together, covered with stiff fulvescent white hair, which extends about half an inch beyond the end. The dimensions are taken from dried skins, and are consequently only approximations ; length of head and body 4 inches ; tail with terminal hairs  $1\frac{1}{2}$ , without hairs 1 ; tarsus and hind-foot to end of claws 0.7 ; ear from orifice 0.35 ; breadth the same.

The following are the dimensions of a broken skull extracted from the skin :—

		Metre.	Inches.
Length, about	.	.029	1.15
Do. of nasal bones	.	.0095	0.38
Breadth of do. behind	.	.002	0.08
Do. do. in front	.	.003	0.12
Width between orbits	.	.0035	0.13
Length of molars of upper jaw	.	.007	0.27
Distance from do. to incisors	.	.0085	0.34
Length of lower jaw from condyle to symphysis	.	.018	0.73

The nasal bones have a slightly concave outer margin, and their posterior termination is not rounded. The incisors are deep yellow in front ; the upper pair having a very shallow groove down the centre. The anterior molar in the upper jaw consists of five prismatic lobes, and has three salient angles on each side ; the second consists of four prisms, and has three angles outside, two inside ; the third is peculiarly formed : it has two strong salient angles on the inside, and two very weak outside in the anterior portion, which is followed by an elongate process having two<sup>1</sup> slight projecting angles on the outside only, so that altogether this tooth has two strong salient angles inside, and four—all much weaker—outside ; the front inner pair separated from the hinder pair by a deep groove.

In the lower jaw the anterior molar is much the largest, and the hinder small ; the first has five projections on each side,—the anterior pair very small and blunt ; the second has three

<sup>1</sup> The hindmost is not shewn on the figure, Pl. X b, fig. 2, as it is scarcely seen on the crown of the tooth ; it is at the inner hinder extremity, or at the left hand lower termination of the figure, and is blunter than the angle just in front of it.

sharp angles on each side; the third also has three on each side, but those on the outer side are weaker.

In colouration this species resembles *A. russatus*, Radde,<sup>1</sup> but that is smaller, with a proportionally longer tail, which is rusty red above, pale ochraceous below, and the teeth are very different, resembling those of *A. mandarinus*.<sup>2</sup> *A. leucura*, Severtzoff, from Western Turkestan, is very differently coloured; it is described as being ashy; the name must, as already observed, be changed, as it is preoccupied.

I find no details as to *Arvicola stoliczkanus* in Stoliczka's notes. He merely mentions finding a new *Phaiomys*,—evidently this species,—at Aktágh. The specimen from the Nubra valley was collected by Dr. Bellew.

### 31. CRICETUS (CRICETULUS) PHÆUS, var.

*Mus phæus*, Pallas, Glires, pp. 74, 261, Pl. XVa.

*Cricetus phæus*, Pall., Zoog. Ros. As., i, p. 163.

1, Sarikol; 2, 3, Panjah, Wakhán,—all skins.

Although the specimens brought differ in some respects from those from Persia,<sup>3</sup> still I think the differences are not much greater than those of Persian specimens between themselves. The Yárd and Pámír skins of this hamster have smaller ears than those collected in Persia, and rather longer fur. But the most important distinction is, that in the former the molar teeth are larger; at the same time the form of the teeth is the same.

The following dimensions are taken from the label of the specimen from Panjah (1). For comparison I give the dimensions in inches of a Persian male, (2) taken on the body like those of the Wakhán animal, and (3) Pallas's original measurements<sup>4</sup> of a specimen probably from near Astrakhan:—

	1♂	2♂	3
Length of head and body . . . . .	3·7	4	3·4
Do. of head alone . . . . .	1·08	1·2	1·17
Do. of tail . . . . .	0·8	1·25	0·75
Do. of ear . . . . .	0·68	0·76	0·5
Do. of fore-foot with claws . . . . .	0·38	0·4	0·4
Do. of hind-foot do. . . . .	0·68	0·7	0·6

The length of the ears in the Panjah specimen is intermediate between the Persian and Russian measurements. From the label of this specimen I take the following additional details:—snout to eye 0·48, snout to ear 0·9, width of fore-foot 0·2, of hind-foot the same, length of hair on the back 0·37, of the longer hairs tipped black 0·7, width of head at base of ears 0·55. Ears rounded, soles of feet white, snout flesh-coloured, iris brown.

The colour varies from pure ashy grey to grey with an isabelline tinge, but the same takes place in Persian specimens.

Since the above was written, both this and the next species have been discovered in Gilgit by Captain Biddulph.

<sup>1</sup> Reise, i, p. 186, Pl. VII, fig. 2.

<sup>2</sup> Rech. Mam., i, p. 131.

<sup>3</sup> Eastern Persia, ii, p. 58.

<sup>4</sup> Glires, p. 263.

## 32. C. (CRICETULUS) FULVUS. Pl. IX, fig. 1; Pl. X b, fig. 3.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 108.

*C. peraffinis* Criceto phæo, sed major atque magis fulvus, arenaceo-fulvus vix cinereus.  
*Long. corporis capitisque* 4·5, *caudæ* 1·4, *auris* 0·75, *tarsi* 0·7 *poll.*

1, Young, north of Sánju pass; 2, Káshghar; 3, Yangihissar; 4, 5, Yárkand; 6, 7, Sarikol; 8, Panjah, Wakhán.  
 All skins, except No. 6, which is in spirit.

Colour above, light sandy brown to sandy grey, no band down the back; lower parts, feet and tail white. Fur very soft, fully half an inch long in the middle of the back in the specimens from Panjah and Sarikol, but only about 0·35 long in those from Yárkand, Yangihissar and Káshghar. The basal portion, except on the abdomen, blackish slaty; this is the colour of three-quarters of the length on the back. The tips are of two kinds, the majority are pale sandy isabelline; but a very large number of rather longer hairs, black in colour, scarcely coarser than the rest, are scattered throughout the fur. These black tips are also found on the head above. On the sides they are rather less numerous than on the back, and the colour is rather more rufous. There is a distinct line separating the dark dorsal region from the white abdomen; the white includes the breast, chin, and the lower parts of the cheeks, with the sides of the head. Whiskers very numerous, the upper dark brown, the lower white, the longest about 1½ inches in length, muzzle blunt; ears moderate, ovate, very thin, nearly naked outside near the base, thinly clad above, with whitish hairs both inside and outside, hairs of the tail short and rather stiff.

The tubercles beneath the fore-foot are 5 in number, besides the hallucar wart representing the thumb, which is smaller than the others; three are in front arranged in a triangle, one in advance of the two others, and the two hindmost in line behind the latter pair, the hallucar tubercle being outside and intermediate in position; on the hind-foot are also 6 tubercles, 2 on the outer side, 3 on the inner and one terminal; the others are not opposite to each other, but alternate; all are about the same size.

The following dimensions are (1) from the label of the Káshghar specimen, (2) from the Sarikol specimen in spirit:—

		1	2
		Inches.	Inches.
Length of head and body	.. . . . .	4·45	4·4
Do. of head alone	.. . . . .	1·35	1·2
Do. of tail	.. . . . .	1·45	1·2
Do. from snout to ear	.. . . . .	1·08	...
Do. do. to eye	.. . . . .	0·6	...
Do. from eye to ear	.. . . . .	0·4	...
Length of ear from front base to tip	.. . . . .	0·75	0·55
Do. measured behind	.. . . . .	0·6	...
Do. from orifice	.. . . . .	...	0·6
Greatest width of ear	.. . . . .	0·6	0·4
Length of fore-foot and claws	.. . . . .	0·42	0·38
Do. hind-foot and do.	.. . . . .	0·7	0·67

“Claws white, soles flesh coloured, muzzle the same, iris brown.”

The following are the dimensions of a skull :—

		Metre.	Inches.
Total length		.030	1.17
Breadth across zygomatic arches		.016	0.64
Do. between orbits		.004	0.16
Length of nasal bones		.012	0.48
Breadth of do. in front		.004	0.16
Length of upper molars taken together		.0045	0.18
Distance from incisors to upper molars		.0085	0.34
Length of lower jaw from condyle to symphysis		.0155	0.6

This species is little more than a large brownish form of *C. phœus*, but it is so much larger that it ought, I think, to be distinguished. I obtained one specimen in Northern Persia which agreed in size very fairly with *C. fulvus*.<sup>1</sup> There appears to be a regular gradation of closely allied forms of grey hamsters, commencing with the little *C. arenarius*<sup>2</sup> and ending with the large *C. isabellinus*,<sup>3</sup> which has the head and body 6 inches long without the tail.

The only difference I can see between the specimens from Yarkand and Káshghar, and those from the Pámír, is the much longer fur which the latter possess, in consequence, probably, of the colder climate they inhabit. As already noticed under *C. phœus*, *C. fulvus* has been found again associated with its smaller relative, by Captain Biddulph, in Gilgit, south of the dividing range between the upper Oxus and the Indus, and within the territories of Kashmir.

From *C. (Cricetulus) griseus*<sup>4</sup> the present form is distinguished by its larger size and longer tail, by its rather darker colouration (judging at least by the figure of *C. griseus*) and the absence of any dorsal band, and by the very different disposition of the tubercles on the soles of the feet.

A species recently described by Severtzoff under the name of *Cricetus murinus*<sup>5</sup> is said to resemble in appearance *Arvicola arvalis*, being dark greyish-brown above, ashy below; the length is 5 inches, of which the tail is  $1\frac{1}{2}$ . This species is found in the Irtish and Ishim rivers in South-Western Siberia. The species recorded by Severtzoff from Western Turkestan are *C. songarus*, *C. acreduila*, and *C. eversmanni*. *C. phœus* may very possibly occur also.

33. NESOKIA BARCLAYANA. Pl. X a, fig. 1.  
(or *N. blythiana*, var.)

*Mus (Nesokia) barclayanus*, Anderson, J. A. S. B., 1878, vol. xlvi, Pt. 2, p. 229.  
*Nesokia indica*, W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 108.

1-5, Srinagar, Kashmir.

When examining the rodents of Dr. Stoliczka's collection, I found it very difficult to determine the species of *Nesokia* for want of examples. I have since obtained many specimens from various parts of India, and Dr. Anderson has recently examined the large collection that has accumulated in the course of the last few years in the Indian Museum, with the

<sup>1</sup> Eastern Persia, ii, p. 58.

<sup>2</sup> Pallas, Glires, p. 265.

<sup>3</sup> De Filippi, Viaggio in Persia, p. 344.

<sup>4</sup> A. Milne-Edwards, Rech. Mamm., i, p. 133, Pl. XII, XIII.

<sup>5</sup> Severtzoff, Turk. Jev., p. 82: Ann. Mag. Nat. Hist., July 1876, Ser. 4, xviii, p. 54.

result of showing that the number of species is considerably larger than it was supposed to be by Blyth<sup>1</sup> and Jerdon.<sup>2</sup> The former considered the various animals described as *Mus indicus* by Geoffroy St. Hilaire,<sup>3</sup> *Mus (Neotoma) providens* by W. Elliot,<sup>4</sup> *Mus kok*,<sup>5</sup> *Mus hardwickei*, and *Nesokia hardwickei*,<sup>6</sup> by Dr. Gray, *Mus huttoni*,<sup>7</sup> by himself, and some other described forms, all to belong to one species, which he called *Nesokia indica*, and to which he referred the *Arvicola indica* of Gray and Hardwicke.<sup>8</sup> He was also disposed to believe that some of the numerous names given by Mr. Hodgson to the various species of rats and mice inhabiting Nepal would be found to belong to the same animal. In some notes subsequently published,<sup>9</sup> after examining the types in the British Museum, Mr. Blyth recognised the distinctness of *N. hardwickei*.

Dr. Jerdon separated the "short-tailed mole rat" of the North-West Provinces, an animal which he identified with Gray's *Nesokia hardwickei*, from the longer tailed *Nesokia* of Bengal and Southern India, and indicated the existence of at least one additional species. I subsequently<sup>10</sup> gave reasons for distinguishing *N. huttoni* of Baluchistan and Kándahár from *N. hardwickei*. I may add that with a much increased knowledge of *N. hardwickei* I doubt whether the differences I then mentioned are constant.

It should be added that Prof. Peters of Berlin, in 1860, gave an excellent description of *Nesokia hardwickei*, with figures of the skull, under the supposition that the genus and species were undescribed, and he called it *Spalacomys indica*.<sup>11</sup>

Dr. Anderson, in his recent paper, considers *Nesokia* a subgenus of *Mus*, and refers to it, besides the mole-rats of Jerdon, the bandicoot, *Mus bandicota v. giganteus*, and an allied species, *M. elliotanus*, previously unnamed, unless it prove, as is not improbable, to be *M. nemorivagus*<sup>12</sup> of Hodgson or the true *M. setifer*<sup>13</sup> of Horsfield. The species referred to the subgenus are classed by Dr. Anderson in three sections,—one, the typical group containing the original type of the genus, *N. hardwickei*, and its allies *N. huttoni* and *N. scullyi*; a second section comprising the *N. indica* of Blyth and Jerdon, which Dr. Anderson renames *N. blythiana*, and from which he separates *N. providens* of Elliot, and another species which he calls *N. barclayana*; and the bandicoot group, *N. giganteus* and *N. elliotanus*. He shews that the *Mus indicus* of Geoffroy St. Hilaire was not a *Nesokia*, and he considers that *Arvicola indica* was the same as *Mus hardwickei*, consequently the *Nesokia indica* of Blyth and Jerdon requires another specific name. He refers the Kashmir species to *N. barclayana*.

The differences between the two more important sections of the genus or subgenus are the following: the bandicoots, forming the third section, do not extend into the countries with which the present work is concerned, and their title to be classed in the genus *Nesokia* is open to some doubt, they being, in fact, intermediate in characters between *Nesokia* and *Mus*. In

<sup>1</sup> J. A. S. B., 1863, xxxii, pp. 328—333.

<sup>2</sup> Mam. Ind., pp. 187, 190.

<sup>3</sup> Desmarest, Mam., p. 299.

<sup>4</sup> Mad. Jour. Lit. Sci., x, p. 209.

<sup>5</sup> Charlesworth's Mag. Nat. Hist., 1837, Ser. 1, i, p. 585.

<sup>6</sup> Ann. Mag. Nat. Hist., 1842, Ser. 1, x, p. 265.

<sup>7</sup> J. A. S. B., 1846, xv, p. 139.

<sup>8</sup> Illustr. Ind. Zool., Vol. i, Pl. X i.

<sup>9</sup> J. A. S. B., 1865, xxxiv, Pt. 2, p. 193.

<sup>10</sup> Eastern Persia, ii, p. 59.

<sup>11</sup> Abhandl. K. Akad. Wiss. Berlin, 1860, p. 143, Pl. ii, fig. 1.

<sup>12</sup> Ann. Mag. Nat. Hist., 1845, Ser. 1, xv, p. 266.

<sup>13</sup> Zool. Researches, Pl.

the typical section of true *Nesokia*, the skull (Pl. X a, fig. 2, 2a, &c.) is very much broader and shorter than in *Mus*, and the head consequently has more the form of *Arvicola*, the brain case is especially short and broad, the muzzle short, the anterior palatine foramina comparatively short and narrow, both molars and incisors are very broad and the worn surface of the former composed of transverse laminæ. The hinder margin of the palatine bones is much thickened. The tail is comparatively short (except in *N. scullyi*), and the claws are flattened and peculiarly adapted for digging. In all these characters the second section forms a transition between typical *Nesokia* and the bandicoots, so that there is a complete series of gradations from an extreme form like *N. scullyi* to a typical rat like *Mus decumanus*. In *N. blythiana* and its allies (Pl. X a, fig. 1, 1a, &c.,) the molars are more distinctly transversely laminated, and both they and the incisors are broader than in *Mus*, although the teeth are inferior in all these characters to those of the typical group of *Nesokia*; the skull is not so broad as in the latter, nor are the anterior palatine foramina so short, but still the skull is much broader and shorter, and the anterior palatine foramina much narrower than in true *Mus*. The tail in this section of *Nesokia* is but little shorter than the head and body, and the claws are more compressed than in *N. hardwickei* and its allies.

I quite agree with Dr. Anderson that if, as he appears to have ascertained satisfactorily, the *Mus indicus* of Geoffroy is a typical *Mus*, the name *indica* is inapplicable to the common *Nesokia* of Bengal, for, as he has also shewn, the *Arvicola indica* of Gray and Hardwicke's "Illustrations of Indian Zoology" agrees better with *Nesokia hardwickei*, with which it was identified by Gray. Dr. Anderson also considers that the *Arvicola bengalensis* of the same publication represents the long-tailed Bengal *Nesokia*. If the fact that these two figures represent the two species of *Nesokia* can be satisfactorily established, *N. hardwickei* must, I think, stand as *N. indica*, and this will be inconvenient, because the name has been generally applied, for at least 16 years, to a distinct species. The long-tailed species, *N. indica* of Blyth and Jerdon, *N. blythiana* of Anderson, would in the same way retain the oldest name of *N. bengalensis*. But the figures in Gray and Hardwicke's "Illustrations" are by no means sufficiently good to render it at all certain what species is represented. There is still, however, much probability that one or more of the names given by Mr. Hodgson, *Mus hydrophilus*, *M. pyctorhis*, *M. macropus*, or *M. plurimammis*, may apply to the Bengal *Nesokia*, and if so, such name will take precedence of *N. blythiana*.

I am also inclined to think Dr. Anderson right in separating *N. providens*, the South Indian form, from his *N. blythiana*. As regards the distinction of *N. barclayana*, however, I am disposed to suspend my judgment. Dr. Anderson has examined the two animals alive and has compared a much larger series than I have, so I adopt his nomenclature, but I cannot help doubting whether *N. barclayana* is more than a local variety of *N. blythiana*, differing slightly in colour, and being of a rather more yellowish-brown tint, owing to its inhabiting a drier climate. The differences by which the two species are distinguished besides colour are small, and consist of a shorter muzzle, larger, longer and more arched skull, and relatively broader nasals in *N. barclayana*. The last character is noted as variable and the difference in size is not sufficient for specific distinction, even if it be constant; but the skull of *N. barclayana* does appear a little more arched. My impression is that the latter is merely a variety; but I may be mistaken.

The Srinagar specimens collected by Dr. Stoliczka have very harsh, coarse fur, yellowish-brown on the back and yellowish-grey below. I think, however, these skins are slightly stained, and that when fresh the yellow tinge was not so marked. The fur on the back

consists in almost equal proportions of fine short underfur, and long coarse grooved piles, some dull yellow, the others, including nearly all the longest, very dark-brown. These piles are especially long on the hinder part of the back, where some are as much as 2 inches in length. All the terminal portion of the longest piles is rounded, but they are more or less flattened beyond the extremities of the short underfur. The feet are well clad above with short coarse hair, the tail has short bristles between the scales. The ears appear to have been thinly clad.

The skull differs very little from those of some Calcutta specimens of *N. blythiana*. The long anterior palatine foramina are still narrower, and more slit-like posteriorly, the palate between the molars is narrower and the upper surface of the skull rather more arched, but the differences are very small. The fur is much longer than in the Bengal rat, but this may merely be the result of inhabiting a colder climate.

It is impossible to give any trustworthy dimensions from dried skins; the tail appears unusually short, but the vertebræ are not preserved. The size is apparently the same as that of *Nesokia blythiana* and *N. barclayana*. The skull agrees best with the latter, and to this species the Kashmir form is referred by Dr. Anderson. The following are dimensions of the adult skull figured in Pl. X a. The sex is not marked on the specimen, but I feel very little doubt, after examining the skin, that the animal was a male.

		Metre.	Inches.
Length from occipital plane to end of premaxillaries	.	·0465	1·83
Breadth across zygomatic arches	.	·027	1·08
Do. of brain pan behind posterior termination of zygomata	.	·017	0·67
Do. of frontal region where narrowest between orbits	.	·006	0·25
Do. of muzzle	.	·0075	0·30
Length of suture between nasals	.	·0135	0·53
Height of skull above second molar (teeth not measured)	.	·016	0·63
Length of bony palate behind incisor teeth to opening of posterior nares	.	·025	1·00
Length of anterior palatine foramina	.	·0105	0·43
Distance from anterior upper molar to incisor	.	·015	0·60
Length of row of upper molars at insertion in jaw	.	·009	0·38
Breadth of palate between anterior upper molars	.	·0045	0·18
Length of mandible from condyle to symphysis	.	·031	1·25
Height to coronoid process	.	·018	0·72
Length of row of lower molars	.	·008	0·33

According to Dr. Anderson, *Nesokia blythiana* is chiefly found in Bengal, although some specimens are recorded from the North-West Provinces. *N. barclayana* is found in the North-West Provinces, Northern Central India and Sind, besides Kashmir. So far as I am aware, this form of *Nesokia* is only found in the damper parts of Sind close to the coast.

The specimens brought from Srinagar comprise three adults marked as obtained in houses, and two young specimens procured from holes in fields. *Nesokia blythiana* abounds in gardens in Bengal and is frequently found in houses, although it is essentially a burrower, living in holes in the ground.

#### 34. NESOKIA SCULLYI. Pl. VIII a; Pl. X a, fig. 2.

Wood-Mason, P. A. S. B., 1876, p. 80.  
*Mughi*, Turki.

General colouration above, light rufescent brown or fawn colour; below, dirty white. Fur very fine and silky, blackish-grey at the base, and for two-thirds of its length above, the

basal portion darker than the terminal, the last third of the longer hairs only being light fawn colour. On the lower parts the hairs are grey with a pinkish tinge at the base. The pale tipped hairs in the middle of the back are about  $\frac{3}{16}$  inch long; a few still longer fine piles being scattered through the fur on the hinder part of the back. The face is earthy-brown; vibrissæ numerous, moderately coarse, black or blackish-brown, except near the tips, where most are white, the longest extend to the ear, and are about 1.8 inch long; some coarse silvery-white hairs along the upper lip. Ears short, rounded, scarcely appearing beyond the fur, and almost naked. Feet flesh-coloured, large, very sparsely clad with short scattered white hairs above, naked below. Claws flesh-coloured. Tail shorter than body and head, and absolutely devoid of hairs except above near the base, where there are a very few scattered short fine hairs, none near the tip; the surface scaly; the scales round and arranged in indistinct rings, about 40 to the inch.

	Inches.
Length from snout to insertion of tail	6.6
Do. of tail	5.2
Do. of ears from orifice	0.6
Do. do. from head outside	0.5
Breadth of ears	0.45
Length of hind-foot without claws	1.55
Do. of fore-foot do.	0.8

The first two measurements were taken by Dr. Scully on the body; the others are from the dried skin.

The following are measurements of the skull, which is nearly perfect:—

	Metre.	Inches.
Length from occipital plane to end of premaxillaries	.046	1.83
Breadth across zygomatic arches	.028	1.12
Do. of brain pan behind posterior termination of zygomata	.017	0.68
Do. of frontal region where narrowest between orbits	.007	0.3
Do. of muzzle	.010	0.4
Length of suture between nasals	.014	0.55
Height of skull above second molar (teeth not measured)	.015	0.6
Length of bony palate behind incisor teeth to opening of posterior nares	.026	1.03
Length of anterior palatine foramina	.007	0.27
Distance from anterior upper molar to incisor	.016	0.6
Length of row of upper molars at insertion in jaw	.011	0.45
Breadth of palate between anterior upper molars	.003	0.13
Length of mandible from condyle to symphysis	.033	1.32
Height to coronoid process	.020	0.78
Length of row of lower molars	.011	0.43

As pointed out by the describer, the species is distinguished from all other forms of the genus *Nesokia* by the long silky hair, naked tail and large feet, and by the great proportional size and breadth of the skull, mandible and teeth; on the whole, it approaches nearest to *N. huttoni*, which is but doubtfully distinct from *N. hardwickei*.

This is the second instance in which a species of *Nesokia (Spalacomys)* has been found within the boundary of the Palearctic region. *N. huttoni* has been obtained in Baluchistan and Southern Afghanistan.

No specimen of *N. scullyi* was obtained by Dr. Stoliczka. The type, a dried skin of a male, now in the Indian Museum, was collected by Dr. Scully on June 11th, 1875, at Sánju, close to the base of the Kuenlun, south-east of Yárcand.

### 35. MUS SUBLIMIS, sp. nov.

*Mus crassipes* ? W. Blanf., J. A. S. B., 1875, xlii, Pt. 2, p. 108.

*Mus subfuscus, subtus albidus, vellere molli, longiusculo, basin versus schistaceo, auriculis pilosis, caudá setosá corporeum cum capite longitudine excedente, pedibus longiusculis. Long. a rostro ad basin caudæ (exempli in spiritu vini conservati) 2·6, caudæ 3·05, auris 0·5, plantæ 0·83 poll.*

1, ♀, Tankse, west of Pankong Lake, Ladák, 13,000 feet.

Colour above hair brown, below whitish, the colours passing into each other; fur soft and rather long, about 0·35 inch on the middle of the back; all, except the tips, both above and below, dark slaty-grey, the terminal portions of the shorter hairs on the back being light-brown, that of the longer hairs, which are about 0·45 inch long and very numerous, dark-brown. Face much the same colour as the back, also with long blackish hairs scattered over it, the upper whiskers black; the lower, some of which are longer than the head, white. Ears oval, clad with rather scattered light rufous-brown hairs near the margin inside, and on the anterior portion of the outer surface, on the posterior outer surface the short marginal hairs are whitish, the hairs on the portion of the outer surface near the head are long and pale coloured. Feet thinly clad with short light-brown hairs, tail with short bristly hairs, which are dusky-brown above, whitish below. The colour of the type has become paler and more rufous since the above description was written in 1875.

The tail, which is fine and tapers gradually and regularly from the base to the tip, exceeds the head and body in length. The hind feet are rather long and narrow, the tubercles beneath them are thus distributed: the distal pair, as usual, close together at the base of the three middle toes, the outer tubercle of the next pair considerably farther from the heel than the inner, and the outer tubercle of the proximal pair nearer to the inner of the second pair than to the proximal inner tubercle. The fourth toe is distinctly shorter than the second. Beneath the fore-foot the two proximal tubercles almost form an oblique line with the hallux, but are rather nearer the wrist; the second digit is shorter than the fourth. All the claws are pale coloured and all compressed except that of the rudimentary hallux.

The following dimensions, being taken from a specimen in spirit, are rather less than those of the animal when alive:—

	Inches.
Length of head and body from nose to insertion of tail . . . . .	2·6
Do. of tail . . . . .	3·05
Do. of head . . . . .	0·95
Do. of ear from orifice . . . . .	0·5
Breadth of do. laid flat . . . . .	0·4
Length of fore-foot ( <i>palma</i> ). . . . .	0·4
Do. of tarsus and hind-foot . . . . .	0·83

The skull differs from those of *M. musculus*, *M. sylvaticus*, *M. bactrianus*, and most other species in having the malar bone distinctly concave on its outer surface, so that the

zygomatic arches when viewed from above or below are curved inwards, and the breadth across them is greatest at the origin of the zygomatic process of the squamosal, and considerably less across the malars. The upper surface of the skull is moderately convex, the frontal and nasal portion almost straight. The interparietal extends nearly the whole width of the skull and is pointed at both extremities, its greatest length (antero-posterior diameter) is more than one-third its breadth. The anterior palatine foramina are large and nearly of equal breadth throughout, and they terminate posteriorly behind the line joining the anterior extremities of the molar teeth. The posterior termination of the palate is regularly concave, the pterygoids short, thickened, nearly parallel, rather far apart, and not divergent posteriorly. The teeth present no peculiarities worthy of notice. The following are dimensions of the skull:—

		Metre.	Inch.
Length from occipital plane to end of nasal bones	.. . . .	.023	.92
Breadth across posterior termination of zygomata	, . . . .	.012	.48
Do. of frontal region between orbits	.. . . .	.0045	.18
Do. of interparietal	.. . . .	.008	.31
Do. of muzzle in front of infra-orbital foramen	.. . . .	.004	.17
Length of suture between nasals	.. . . .	.008	.32
Greatest height of skull	.. . . .	.009	.35
Length of anterior palatine foramina	.. . . .	.005	.20
Do. of bony palate from incisors to opening of posterior nares	.. . . .	.0095	.38
Do. of pterygoid bones	.. . . .	.004	.16
Do. of row of upper molars	.. . . .	.004	.16
Breadth of palate between anterior molars	.. . . .	.003	.11
Length of mandible from condyle to symphysis	.. . . .	.0125	.5
Height of do. to coronoid process	.. . . .	.006	.25

I am unable to identify this mouse with any known species. In the preliminary list of Dr. Stoliczka's collections I referred it, with great doubt, to a species very imperfectly described by Blyth<sup>1</sup> under the name of *M. crassipes*. The description was as follows:—

Like the preceding (*M. homourus*), but with the tail rather longer than the head and body; length  $2\frac{3}{4}$ , tail  $3\frac{1}{4}$ , hind foot  $\frac{3}{4}$  inch; the feet particularly large and, like the tail, well furnished with coarse, short setæ. From Masuri.

*Mus homourus*<sup>2</sup> is said to be coloured like *M. decumanus*, but purer, rufescent brown above and rufescent white below.

The dimensions of *M. crassipes* correspond fairly with those of the mouse from Western Tibet, but the main structural character of the former, the large feet, are wanting in the latter, and as I have received from Dr. Scully specimens of a large footed mouse obtained in Nepal, agreeing better with Blyth's description, I consider the Tibetan species must be distinct. There is no specimen of *M. crassipes* in the Indian Museum, nor, so far as I am aware, has the type been preserved.

I regret that no figure of this species has been prepared. The peculiarities of the skull may be easily understood by referring to the figure of that of *M. pachycercus*, Pl. X b, fig. 4, 4a, 4b. In *M. sublimis* the zygomatic arch viewed from above or below is concave posteriorly, instead of straight, and the opening of the posterior nares is far broader, the posterior margin of the palatines evenly rounded, and the pterygoids subparallel instead of divergent, and somewhat thickened. The form of the pterygoids is peculiar and characteristic.

<sup>1</sup> J. A. S. B., 1859, xxviii, p. 295, note. See also Jerdon, Mam. Ind., p. 204.

<sup>2</sup> Hodgson, Ann. and Mag. Nat. Hist., 1845, xv, p. 268.

## 36. MUS PACHYCERCUS. Pl. IX, Fig 2; Pl. X b, Fig 4.

W. Blanf., J. A. S. B., 1875, xliv, Part 2, p. 108.

*Mus affinis* M. bactriano, sed minor, caudā breviore, crassiusculā, setosā, supra fusco-fulvus, subtus albidus, auriculis ovalibus majusculis pilosis. Long. (exempli in spiritu vini conservati) a rostro ad basin caudæ 2·3, caudæ 2, auriculæ 0·5, plantæ 0·65 poll.

1, Sánju; 2, 3, Kárghalik; 4, 5, 6, 7, 8, 9, 10, Yárkand; 11, Yangihissár; 12, no label;—all skins, except two from Yárkand, which are preserved in spirit.

Colour above sandy-brown to hair-brown, becoming in some specimens pale and rufescent on the sides, under parts white, the colours distinctly separate on the sides. The colour of the upper parts is darker in some skins than in others, and is occasionally slightly greyish (mouse-brown), but usually of a more sandy or yellowish tint like *M. bactrianus*. Fur moderately soft, rather long, (0·3 to 0·35 inch on the middle of the back,) the basal portion blackish slaty; this is the colour of at least three-fourths of the length on the upper parts; the terminal portion in general is light brown, from sandy to light hair-brown, many longer hairs with blackish tips being scattered amongst the fur. On the breast the fur is white throughout, and on the abdomen only the extreme base is dark. Upper part of the head the same colour as the back, whiskers mostly black, only the lowest being white, none appear much to exceed the head in length. Ears large, rounded, hairy; the hairs covering all the posterior portion of the inside are short and brown and rather thinly scattered; some longer hairs near the anterior margin; on the outside the hairs are even shorter except towards the base of the ear, where they are longer and pale in colour. Feet pretty thickly clad above with short white hairs; soles naked. Tail thick, shorter than the body and head, thinly clad with short white bristles throughout; the skin is dark on the upper surface, pale below.

The skins are about  $2\frac{3}{4}$  to 3 inches long (head and body); tail 2 to  $2\frac{1}{4}$ . The following dimensions from two specimens in spirit are, of course, somewhat contracted, the ears especially, but still they are far more trustworthy than any taken on dried skins:—

			Inches.	Inches.
Length from nose to anus	.	.	2·35	2·3
Do. of tail	.	.	1·9	2
Do. of ear from orifice	.	.	0·48	0·5
Breadth of ear laid flat	.	.	0·39	0·4
Length of fore-foot (palma)	.	.	0·3	0·3
Do. of hind-foot and tarsus	.	.	0·65	0·65

A skull measures 0·85 inch in length by 0·47 in breadth; the nasal bones are 0·32 long. It is a longer skull than that of *M. bactrianus*, with much longer nasal bones and longer anterior palatine foramina. The incisors are deep yellow. Length of upper molars 0·13 inch.

This is apparently a house-mouse, one specimen from Kárghalik being labelled "caught in the house," and closely allied to *M. bactrianus*,<sup>1</sup> the house-mouse of Persia, Afghanistan and North-Western India. It has the same sandy-brown colour in general, but it has a shorter and thicker tail. Another form, shewing some resemblance, is *M. pygmæus*<sup>2</sup> from Se-chuan in China, but this is distinguished by having much smaller ears and by not being white below.

<sup>1</sup> Blyth, J. A. S. B., 1846, xv, p. 140; xxxii, p. 347.—W. Blanford, Eastern Persia, ii, p. 56, Pl. V, fig. 2.

<sup>2</sup> A. Milne-Edwards, Rech. Mam., p. 291, Pl. XLIII, fig. 1.

A third closely allied species is very probably *M. hortulanus*<sup>1</sup> from Odessa, but that is rather larger, reddish-brown above, and dirty tawny below. Another allied form is apparently *M. prætextus*<sup>2</sup> from Arabia and Syria, but it has a reddish streak down each side, naked ears, and the tail dark on both sides.

There is yet another Western Asiatic mouse, *Mus wagneri*, originally described<sup>3</sup> from the country between the lower Volga and the Ural Mountain in the following terms:—*Supra caudaque griseo-fulvus, subtus abrupte candidus, auriculis majusculis, verruca halucari laminata, (? laminata,) cauda quam corpus breviore.* The colour does not agree with that of *M. pachycercus*, and in the latter the hallucar tubercle is not laminated. *Mus. wagneri*, too, is smaller than *M. minutus* of Pallas, which is a smaller animal than *M. pachycercus*.

According to Severtzoff<sup>4</sup> *M. wagneri* is an extremely common resident throughout Western Turkestan. He also mentions as *Mus wagneri, var. major* (*M. tokmak?* n. sp.) a form, which he says only differs from *M. wagneri* in its larger size, in which it approaches *M. sylvaticus*. It is a house-mouse, and said to have been obtained in a house in a village built in 1864. No dimensions are given, nor any description except the comparison with *M. wagneri*. Tokmak is the name of a town between Vernoe and Auliáta, lying north-west of Lake Issik and nearly due north of Káshghar. It is far from clear whether *M. tokmak* is proposed as a name, and the description is insufficient to enable the species to be recognized.

### 37. MUS ERYTHRONOTUS.

W. Blanf., Ann. Mag. Nat. Hist., 1875, Ser. 4, xvi, p. 311.—Eastern Persia, ii, p. 54, Pl. V, fig. 3. *Mus sylvaticus*, var. W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 108; *nec* Linn.

1, Káshghar; 2, 3, 4, 5, Panjah, Wakhán.

In external characters there is very little difference between the skins from Káshghar and Wakhán, and those of the long-tailed field mouse of Europe, *M. sylvaticus*, and in the preliminary list of Dr. Stoliczka's collections the specimens in question were assigned to the European species. The means of comparison were small, the specimens of *M. sylvaticus* in the Indian Museum had faded in colour from exposure, and no skull was available. At the same time I was disposed to consider *Mus erythronotus*, described by myself from Persia, as a variety of *M. sylvaticus*. The skins from Káshghar and Wakhán, I may add, agree very fairly with the description of *M. sylvaticus* by Schreber<sup>5</sup> and Blasius.<sup>6</sup>

Recently, however, I have been enabled, by the kindness of Dr. Anderson, to compare skulls of the Wakhán mouse with one of *M. sylvaticus*, and although the two are nearly allied, there are some differences which make me doubtful whether the former may not belong to a distinguishable race. The skull of *Mus sylvaticus* compared is smaller, measuring only an inch in length, and is from an English specimen. The shape is, in most respects, similar, but when viewed from behind, the occipital portion is much higher in proportion

<sup>1</sup> Nordmann, *apud* Wagner, Supp. Schreb. Säugth., iii, p. 410.

<sup>2</sup> Licht., *apud* Wagner, Supp. Schreb. Säugth., iii, p. 422.

<sup>3</sup> Eversman, Bull. Soc. Hist. Nat. Mosc., 1848, i, p. 191, Pl. I, fig. 2.

<sup>4</sup> Turk. Jev., p. 61; Ann. Mag. Nat. Hist., July, 1876, Ser. 4, xviii, p. 53.

<sup>5</sup> Säugthiere, iv, p. 651, Pl. CLXXX; Wagn. Supp. iii, p. 411, &c.

<sup>6</sup> Säugthiere Deutschlands, p. 322.

to its breadth than in the skulls taken from the Panjah skins, and so is the foramen magnum. The opening of the posterior nares in the English skull, too, is much narrower, the breadth being less than that of the anterior molar, whilst in the Panjah skull the breadth exceeds that of the molar considerably; and in the European species the hinder upper molar is much smaller, being only about a fourth of the size of the second molar, whereas in the Panjah skulls the third molar is fully half the size of the second. In the lower jaw also the posterior molar is comparatively smaller in the skull of the English mouse, but the difference is less than in the upper molars.

No specimens of *Mus erythronotus*, obtained by me in Northern Persia, are available for comparison, those destined for the Indian Museum having apparently been mislaid, but the resemblance of the Wakhán skins and skulls to the figure and description is so close, that the two are probably identical. The only difference I can detect is that in typical *Mus erythronotus* the tail is of the same length as the head and body together, as it is in *M. sylvaticus*; whereas in the Wakhán mouse the tail appears to be a little shorter, in the proportion of 7 to 8. This alone is insufficient for specific distinction. It is, however, by no means improbable that *Mus erythronotus* is merely a local race of *M. sylvaticus*, and with a good series of specimens from various localities, the two might be found to pass into each other. The *Mus sylvaticus*, var. *major*, of Radde<sup>1</sup> is probably allied to the present form.

The following is a description of the Káshghar and Panjah long-tailed field-mouse:—

General colour hair-brown above, becoming rufous in some specimens on the sides, white below, the two colours sharply divided and the line of division running back from the nostrils, so that the upper lip and part of the cheeks are white. Tail brown above and white below; feet white. The fur of the upper parts is long and soft (0·4 inch long on the middle of the back) at least three-fourths of the length blackish grey, the tips mostly yellowish brown, but mixed with numerous slightly longer hairs which are black; these black-tipped hairs disappear on the sides: head above the same colour as the back. Whiskers rather longer than the head, the upper black, lower white; ears oval, thinly clad inside and out with short hairs, which are brown, except on the posterior margin, where they are whitish. Feet clothed with white hair above: the thumb has a small claw. Tail covered below and on the sides with whitish hairs, longer than in *M. pachycercus*, the hairs on the upper surface being brown in general, but partly white in some specimens.

In skins the head and body measure about 4 inches, tail  $3\frac{1}{2}$ . The following measurements are noted by Dr. Stoliczka on the label of one of the Panjah specimens:—

	Inches.
Length of head and body . . . . .	4
Ditto of tail . . . . .	3·5
Ditto of head . . . . .	1·15
Distance from snout to eye . . . . .	0·5
Ditto from snout to ear . . . . .	1·
Length of ear from front base . . . . .	0·65
Ditto ditto measured from behind . . . . .	0·58
Width of ear . . . . .	0·5
Length of fore-foot . . . . .	0·4
Ditto of hind-foot . . . . .	0·9

Iris brown, soles of feet fleshy white, reddish at the base.

<sup>1</sup> Reisen, i, p. 103, Pl. V, fig. 3, 4.

The following are the dimensions of a perfect skull, taken from one of the skins from Panjah :—

		Metre.	Inches.
Length from occiput to end of nasal bones	.	·0265	1·08
Breadth across hinder part of zygomatic arches	.	·013	0·53
Least breadth of frontal region between orbits	.	·004	0·16
Length of nasal bones	.	·010	0·4
Do. of anterior palatine foramina	.	·005	0·19
Do. of row of upper molars	.	·004	0·15
Do. of lower jaw from angle to symphysis	.	·0125	0·52
Height of ditto ditto	.	·007	0·29

38. GERBILLUS CRYPTORHINUS. Pl. X; Pl. X b, fig. 5.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 108.

*G. supra rufesceni-arenaceus, subitus albus, coloris dorsalis ventralisque limite bene notato, rostro in lobum semicircularem, intus pilis brevibus sparsis indutum, nares obtectem, desinente; caudā corporis capitisque longitudinem excedente, cum dorso superne fere concolore, sed magis rufescente nisi apicem versus, ubi nigrescit, subitus pallidior, pilis nonnullis ad apicem caudae longioribus nigrescenti-fuscis, auriculis mediocribus, ovalibus, extus antice dense pilosis, mystacibus confertis, capitem longitudine parum excedentibus, supremis nigris, cæteris albis; vellere longiusculo, molli, nitido, basin versus ad tergum schistaceo; palmis subnudis, pilis sparsis indutis, plantis confertissime pilosis; dente molario ultimo simplici, incisoribus unisulcatis. Long. exempli majoris nuper occisi a rostro ad basin caudæ 5·5, caudæ 6·25, auris 0·75, pedis posterioris a calcaneo 1·4 poll. Long. exempli minoris 4·5, caudæ 5 poll.*

1, 2, 3, 4, 5, Kárghalik; 6, Yárkand; 7, Marálbáshi; 8, 9, 10, Yangihissár; all skins; 11, in spirit, no label.

Colour above sandy rufescent, some specimens rather more rufous than others, below white, the two colours sharply divided on the sides; cheeks pale; supercilia whitish; feet white; tail above rather more rufous than the back, paler and occasionally whitish below, becoming dark-brown or blackish above near the end, and with the slight tuft of longer hairs at the end of the same dark colour. Fur soft and glossy, about half an inch long in the middle of the back, all the basal portion, being at least three quarters of the length, dark ashy, the terminal portion pale yellow-brown to pale rufous, with numerous longer hairs with black tips mixed. On the under surface the hairs are white throughout. On the tail the hair is rather short, coarse, and close together; there are a very few longer black tips mixed, but scarcely enough to produce an effect in the general colour.

The ears are oval and of moderate length, densely clad with brown hairs on the anterior portion of the outer surface, and with a fringe of longer hairs on the anterior margin; the posterior portion of the external surface is nearly naked, except near the margin; and the anterior portion of the inner surface completely destitute of hair; but the inner surface is more hairy near the hinder margin. The whiskers are very numerous, the longest slightly exceeding the head, the uppermost behind being black; all the rest white; all are mixed at the base with long hairs which cover the side of the nose. Soles of the fore-feet with scattered white hairs, but nearly naked; those of the hind-feet densely covered with hair

everywhere, except at the extreme tips of the toes and at the heel. Mammae 8, 4 pectoral, and 4 inguinal, as usual in the genus.

The most remarkable character of this species is the presence at the end of the snout of a semicircular lobe<sup>1</sup> which forms a flap completely covering the openings of the nostrils. This lobe can, of course, only be well seen in the specimen preserved in spirit, in the dried skins its presence can sometimes be detected, but not always. In the only spirit specimen, an adult female, the flap measures about 0·3 inch in breadth, and is barely an eighth of an inch long. It is hairy both outside and inside, the hairs being very short and rather scattered inside; the surface below the nostrils covered by the flap is also hairy. The use of this lobe is evidently to keep out sand and dust from the air-passages.

The following measurements are Dr. Stoliczka's, taken from the label of a specimen (sex not marked) from Kárghalik, and are doubtless from the fresh animal. On the label it is noted that the specimen was the largest seen. I add in another column (2) the dimensions of the specimen preserved in spirit, a female, and of course slightly contracted:—

	Inches.	Inches.
Length from nose to rump . . . . .	5·5	4·5
Do. of tail without the hair at the end . . . . .		5
Do. of do. with do. . . . .	6·25	5·75
Distance from eye to snout . . . . .	0·8	
Do. do. to ear . . . . .	0·3	
Length of ear from front base to tip . . . . .	0·75	0·55
Do. from orifice . . . . .		0·5
Greatest breadth of ear . . . . .	0·6	0·4
Length of fore-foot . . . . .	0·5	0·45
Do. of hind-foot . . . . .	1·4	1·3

The following are the dimensions of a skull:—

	Metre.	Inches.
Length from occiput to end of nasal bones . . . . .	·037	1·45
Breadth across hinder part of zygomatic arches . . . . .	·019	0·76
Least breadth between orbits . . . . .	·007	0·28
Length of nasal bones . . . . .	·014	0·55
Do. of lower jaw from condyle to symphysis . . . . .	·0195	0·76

In the skull of this species, the lachrymal bone appears not to be ankylosed to the adjoining bones, as it is in other forms of the genus. It is free in one fully adult specimen, and entirely wanting, having evidently been lost, in two others, which have been extracted from skins. I noticed that the process of the lachrymal, which in other species of *Gerbillus* projects from the anterior angle of the orbit, was deficient in the first two skulls which I examined, but it was only when I obtained a third skull, extracted from a specimen in spirit, that I found this was due to the lachrymal not being united to the surrounding bones as it usually is.<sup>2</sup>

This species is allied to *G. meridianus*<sup>3</sup> from the Caspian, but is considerably larger, with a much longer tail. It is still nearer to *G. tamaricinus*,<sup>4</sup> but differs in colour, in

<sup>1</sup> I am indebted to Mr. Oscar Fraser for calling my attention to this character, which he noticed when extracting the skull. I had overlooked the lobe at my first examination.

<sup>2</sup> Although it is not very probable, I would suggest the possibility of the absence of this process in *Rhombomys* (*Meriones opimus*), as noticed by Brandt (Bull. Acad. Sci. St. Pet., xiv, 1856, p. 76,) being due to the same cause.

<sup>3</sup> *Mus meridianus*, Pallas, Reise, ii, p. 702; *Dipus meridianus*, Pal., Zoog. Ros. As., i, p. 182.—*Mus longipes*, Pallas, Glires, p. 316.

<sup>4</sup> *Mus tamaricinus*, Pallas, Glires, p. 323.

having the tail longer than the body, and apparently in having a shorter head and more hairy ears. Another form showing considerable resemblance is *G. unguiculatus*<sup>1</sup> from Chinese Mongolia, which, however, is represented as wanting the dusky tip to the tail, and as having the tail shorter than the body. This species agrees with *G. cryptorhinus* in having hairs on the soles of the fore-feet as well as on those of the hind, but the skull is more convex above, and has the prominent lachrymal process united to the frontal. From the other Asiatic forms there are greater differences. From *G. indicus*<sup>2</sup> and *G. persicus*<sup>3</sup> the present species is distinguished by its hairy hind-feet and shorter head; from *G. erythrurus*<sup>4</sup> and *G. hurrianae*<sup>5</sup> by its very differently shaped and much longer head, its white under surface, &c.; and from *G. psammophilus*<sup>6</sup> by its much longer tail. It is, moreover, to the best of my knowledge, distinguished from all the species named by the peculiar flap covering the nostrils. There is certainly nothing of the kind in *G. indicus*, *G. persicus*, *G. hurrianae*, or *G. nanus*, nor can I find it described in any other species.

A *Gerbillus*<sup>7</sup> is described by Severtzoff from Western Turkestan under the name of *Meriones collium*. It is said to be rufescent above, white below; the hairs of the tail rufescent and black mixed; the tuft at the end of the tail of two colours, fuliginous and canescent; "the black tail-tuft surrounded by a pale-grey margin." The description does not agree sufficiently with the present form to render it probable that it refers to the same species; the description of the tail, and especially of the tuft at the end, shows the Western Turkestan animal to be distinct, and the tail is said to be shorter than the body. *G. collium* is, however, said to be allied to *G. tamaricinus*; so it probably resembles *G. cryptorhinus* very closely. *G. opimus*, *G. meridianus*, and *G. tamaricinus* are also said to be found in Western Turkestan.

Family—*DIPODIDÆ*.

39. *DIPUS LAGOPUS*.

Lichtenstein in Eversman's Reise nach Buchara, p. 121.—Brandt, Bull. Ac. Imp. St. Pet., 1844, ii, p. 218.

1, Koshtak, South of Yárkand; 2, Yárkand; 3 Yangihissár.

These specimens agree on the whole fairly with Lichtenstein's original description and measurements; the ears are rather larger, but the difference does not appear great. The tarsi are also a little longer. The following is a short description: colour above light sandy-brown, slightly washed with dusky; below pure white; a white band across the outside of the thigh. Tail pale-brown above, whitish below, with a tuft of longer hair, altogether about  $2\frac{1}{2}$  inches long; at the end the terminal portion pure white, the proximal portion black or dark-brown on the upper part and sides, but brown or white beneath the tail. The fur is very soft and rather long, 0·6 to 0·8 inch in the middle of the back; on the upper

<sup>1</sup> A. Milne-Edwards, Ann. Sc. Nat., Ser. 5, Vol. vii, 1867, p. 377.—Rech. Mam., p. 142, Pl. Xa, XI.

<sup>2</sup> Hardwicke, Trans. Lin. Soc., viii, p. 279, Pl. VII.

<sup>3</sup> W. Blanf., Eastern Persia, ii, p. 66, Pl. VII, fig. 1.

<sup>4</sup> Gray, Ann. Mag. Nat. Hist., 1842, Ser. 1, x, p. 266 (*nec* Jerdon, Mam. Ind., p. 187.)

<sup>5</sup> Jerdon, Mam. Ind., p. 186.—W. Blanf., Eastern Persia, ii, p. 68.

<sup>6</sup> A. Milne-Edwards, Rech. Mam. p. 144.

<sup>7</sup> Turk. Jev., p. 83; Ann. Mag. Nat. Hist., July, 1876, Ser. 4, xviii, p. 55. It appears to have been first called *M. montanus*, but the name was changed because of there being a South African species called *Gerbillus montanus*.

parts it is ashy-grey at the base and for the greater part of its length, pale sandy-brown near the end, the extreme tip dusky brown; on the lower parts it is white throughout. Ears about half the length of the head, oval, naked inside, thinly clothed with short brown hair outside; face sandy; the hairs grey at the base; sides of head whitish; whiskers, as usual, very long, exceeding 3 inches; the uppermost brown, the longest white, except at the base, the lower entirely white; the long hairs beneath the hind-feet all white, as are the feet throughout.

The following dimensions, doubtless from the freshly killed animal, are marked by Dr. Stoliczka on the label of the specimen from Koshtak:—

	Inch.
Whole length, tail included . . . . .	11.75
Length of tail (hairs at end included apparently) . . . . .	6.75
Distance from snout to eye . . . . .	0.7
Do. eye to ear . . . . .	0.25
Length of ear measured behind . . . . .	0.75
Breadth of do. . . . .	0.55
Length of fore-foot and claws . . . . .	0.55
Do. hind-foot . . . . .	0.8
Do. tarsus . . . . .	1.75
Length of foot (hind-leg) measured from knee. . . . .	4

In dried specimens the ear measures 0.65 from the orifice, and 0.5 in width; tarsus and hind-foot from calcaneum to end of claws 2.35.

The following are the dimensions of an adult skull:—

	Metre.	Inches.
Length . . . . .	.033	1.3
Breadth across zygomatic arches . . . . .	.021	0.84
Length of nasal bones . . . . .	.013	0.52
Breadth of do. behind . . . . .	.003	0.12
Do do. in front . . . . .	.004	0.16
Height of orbit . . . . .	.008	0.3
Breadth of do. . . . .	.0045	0.18
Breadth of frontal region between orbits . . . . .	.010	0.4
Length of molars of upper jaw taken together . . . . .	.006	0.23
Breadth of palate between last molars . . . . .	.004	0.15
Length of lower jaw from angle to symphysis . . . . .	.0155	0.6
Height of do. . . . .	.0075	0.29

The dentition agrees with Brandt's description. There are 4 molars in the upper jaw, 3 in the lower, on each side; the anterior upper molar is minute, simple, almost cylindrical; the other three each with 3 convex folds outside, the anterior fold being much smaller than the others, and two folds inside; in the lower jaw the anterior molar has 3 folds inside, 2 outside, the second 3 folds on each side, the third 2 folds outside, but no distinct fold inside, a groove which occurs there being confined to the crown of the tooth and doubtless disappearing in older skulls.

This species was described by Lichtenstein from a pair obtained by Eversman, on his return journey from Bokhara, in the deserts near the Sea of Aral. Severtzoff includes it in the list of animals found in Western Turkestan.<sup>1</sup> It is a typical *Dipus*. *D. jaculus*, *D. acontion*, *D. sagitta* var. *telum*, and *D. platyurus* are also said by Severtzoff to be found in the same country.

<sup>1</sup> Turk. Jev., p. 62; Ann. Mag. Nat. Hist., July, 1876, Ser. 4, xviii, p. 56.

Family—*LEPORIDÆ.*40. *LEPUS HYPΣIBIUS.* Pl. III, fig. 1; Pl. IVa, fig. 1.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 214.

*Lepus pallipes*, Blyth, Cat. Mam. Mus. As. Soc., p. 131.—W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 109, *nec* Hodgson.

*L. oiotolus*, Adams, P. Z. S., 1858, p. 520, *nec* Hodgson.

*L. major, rufescens, nigro-adumbratus, subitus albus, uropygio fuscescens-griseo, caudā floccosā, omnino albā, vellere dorsali densissimo subcrispato, auriculis breviusculis, capitem longitudine parum excedentibus, antice extus fusco-rufescensibus, postice albescensibus vel albis. Long. corporis cum capite in corio dessicato ad 24 poll., tarsi 5, auriculæ a capite 4·5, cranii 3·6.*

1, Pamzal, Changchenmo valley (immature); 2 Kium, 15,500 feet, adult; both localities in Northern Ladák.

The following description is taken from the Kium specimen, which was killed in October. Colour rufous-brown, more or less mixed with black on the back, dusky ashy on the rump; lower parts white with a slight rufescent tinge. Fur long, woolly, rather curly and thick; on the anterior portion of the body the hairs are about  $1\frac{1}{4}$  inches long, ashy at the base; further back the basal portion becomes creamy white; beyond the middle of each hair there is a blackish ring, then a pale-brown one, the extremity being black. Towards the rump, the hairs are fully two inches long, and for the most part ashy-grey throughout, a few only having short black tips. On the sides the hair is rufous-brown, except at the base, where it is ashy, on the lower parts white with a slight rufous tinge throughout. On the neck the hairs are rufous-brown, those on the back of the neck having ashy tips; on the breast they are paler rufous. Head brown, whitish round the eyes, whiskers partly black, partly white; outside surface of ears brown in front, whitish behind, the brown hairs having short black tips, no distinct dark band in front. Extreme tip of ears black, the colour only running a short distance down each margin. Ears inside clad, towards the tip and posterior margin, with buff hairs, a brown band near the hinder margin, which is buff. Tail white throughout. Limbs chiefly white, a brownish band running down the anterior portion of the fore-legs.

In the younger specimen from Pamzal, the hinder portion of the ear is white, and the black tips to the dorsal fur less developed, a pale streak running along each side of the face, through the eye. Both specimens appear a little stained in parts. In both the thickness of the fur beneath the tarsi is remarkable.

The length of the adult skin from Kium, as nearly as it can be measured round the curve of the back, is 24 inches from nose to rump; ears from orifice  $3\frac{1}{2}$ , from the head between the ears  $4\frac{1}{2}$ , breadth of ear laid flat two inches (all these measurements would be more in fresh specimens), tarsus to end of claws 5 inches.

I learn from Dr. Cayley that hares in Tibet vary much in colour with the season. The specimens obtained were shot in October, when they had probably assumed their winter garb. They are said, however, to become paler and greyer in winter.

The following are the dimensions of the skull in the Kium specimen :—

	Metre.	Inches.
Length of skull from occiput to front of incisors . . . . .	0.92	3.63
Greatest breadth of skull across posterior portion of zygomatic arches . . . . .	.044	1.73
Width between orbits . . . . .	.026	1.02
Length of nasal bones . . . . .	.037	1.46
Breadth of do. behind . . . . .	.017	0.68
Do. do. in front . . . . .	.014	0.55
From base of hinder upper incisor to foremost molar . . . . .	.027	1.06
Length of the row of upper molars taken together at base . . . . .	.016	0.63
Do. of palate behind anterior palatine openings . . . . .	.007	0.27
Breadth of palate between 3rd pair of molars . . . . .	.012	0.5
Length of lower jaw from angle to symphysis . . . . .	.062	2.46
Height of do. . . . .	.040	1.59

The specimen in the collection of the Asiatic Society of Bengal (now in the Indian Museum), which was identified by Mr. Blyth with *L. pallipes*, belongs evidently to the same species as the skins collected by Dr. Stoliczka in Ladák. This specimen was, I believe, presented by Captain Smyth, who collected in the Western Himalaya and in Western Tibet, but the name of the donor is omitted in Mr. Blyth's catalogue.

I was at first disposed to identify this hare with *L. pallipes*, Hodgson, and I included it under this name, though with a mark of doubt, in the list of Dr. Stoliczka's collections, J. A. S. B., 1875, p. 109. After this list was published, however, I received from Mr. Mandelli, of Darjiling, specimens of a hare which I have no hesitation in identifying with the true *L. pallipes*, and I found them to differ, both in the skins and skull, from the present species. I consequently described the Western Tibetan form as *L. hypsibius*.<sup>1</sup>

The differences between the two species are that the fur in *L. hypsibius* is denser and longer on the tarsi, and less woolly on the back; the size is larger, but the ears in proportion considerably shorter, and rather differently coloured. The dark band on the anterior portion of the ears, and the whitish posterior surface, are more developed in *L. pallipes*, and the inner surface is whiter. The general colouration of *L. hypsibius* is much more rufous. In the skull of *L. hypsibius* the teeth are larger, the palatal opening narrower behind, the forehead less concave, and the posterior portion of the nasals differently shaped.

*L. hypsibius* appears to be found throughout a considerable tract in Western Tibet, keeping always to considerable elevations, but the relative distribution of this and the other Tibetan hares is very imperfectly known.

There is a bare possibility that this may be the *L. oistolus*<sup>2</sup> of Hodgson, described from young specimens, and stated by its describer to be found in Ladák<sup>3</sup>; but I think it is not the same, for young specimens of *Lepus pallipes* agree much better with Mr. Hodgson's description. The ears of *L. oistolus* are said by Waterhouse<sup>4</sup> to be similarly coloured with those of *L. tibetanus*. This is not the case in *L. hypsibius*.

<sup>1</sup> The name in this case, as in that of *Mus sublimis*, is given on account of the high elevation at which the species is found living.

<sup>2</sup> J. A. S. B., ix, 1840, p. 1186.

<sup>3</sup> J. A. S. B., xi, 1842, p. 288.

<sup>4</sup> Rodentia, p. 62.

41. *LEPUS PALLIPES*, var. Pl. III, fig. 2.

Hodgson,<sup>1</sup> J. A. S. B., 1842, xi, p. 288.—Waterhouse, Rodentia, p. 62.

? *L. oistolus*, Hodgs., J. A. S. B., 1840, ix, p. 1186.

? *L. tibetanus*, Anderson, P. Z. S., 1871, p. 563, nec Waterhouse.

*Tugh-toskhan* (mountain hare), Yarkandi (Scully).

1. No label.

The only specimen which I refer to this species is without a label, but I think it very probable that it was shot in the Kárákásh valley. An examination of the skull shows that it is just adult.

The general colouration is pale rufous-brown, the whole of the rump being pure ash-grey. The basal portion of the fur is dark slaty everywhere, except on the middle of the back, where it is very grey and nearly white, and on the lower parts and tail, where the hair is white throughout. There are very few black tips to the hair on the back; a few longer black hairs are mixed, but they are not numerous, and they are so fine that they are easily overlooked. The ends of the hairs on the nape and along the back of the neck are pale grey. Sides of the neck and breast pale rufous. Tail white, except near the base above, where there are a few dark-grey hairs. On the ears dark-brown longitudinal bands are conspicuous on the anterior outer portion and the posterior inner surface. The anterior edge of the ear is white, the posterior edge buff inside, the upper portion of the inside surface white. The anterior portion of the outer surface (except where dark-brown or white) is rufous-brown, the posterior portion white, becoming ashy near the base. The extreme tip is black; this colour runs a short distance down the anterior, and nearly half-way down the posterior edge. Face brown, with a well-marked, pale, lateral band through the eye; side of nose whitish; the longer whiskers black near the base, white on the terminal portion; other whiskers black, except a few of the lowest, which are white.

The fur is extremely dense, soft and woolly, slightly curved on the back and sides; the hairs on the tarsus not so long as in *L. hypsibius*.

The length of the skin from nose to rump is about 18 inches; tail, including the hairs at the end, 5; tarsus, 4·6; ears from the head 4·5, from the orifice 3·6.

The following are the dimensions of the skull:—

		Metre.	Inches.
Length from occiput to front of incisors	.. . . .	·090	3·55
Greatest breadth across posterior portion of zygomatic arches	.. . . .	·0425	1·68
Width between orbits	.. . . .	·027	1·05
Length of nasal bones	.. . . .	·035	1·45
Breadth of do. behind	.. . . .	·019	0·74
Do. do. in front	.. . . .	·014	0·55
Length from base of hinder upper incisors to foremost molar	.. . . .	·027	1·05
Do. of the row of upper molars	.. . . .	·0145	0·57
Do. of palate behind anterior palatine opening	.. . . .	·006	0·24
Breadth of palate between 3rd pair of molars	.. . . .	·0125	0·5
Length of lower jaw from angle to symphysis	.. . . .	·065	2·55
Height of do.	.. . . .	·038	1·5

Of the original types of *L. pallipes* described by Hodgson, two were from Lhassa and one from Sikkim. Through the kindness of Mr. Mandelli of Darjiling, I have had an opportunity

<sup>1</sup> In the original description the name is printed *pallipes*. I think this must be a mistake or misprint for *pallidipes*, as the English name is given as "white-foot." As the same specific name, however, is given to the Indian wolf and to some other animals, it would be inconvenient to change it.

of examining some specimens of hares procured from the portion of Tibet north of Sikkim. These specimens agree well with the original description of *L. pallipes*, except that the colour of the lower parts is white, not rufescent hoary (the latter is probably a mistake), and that I am unable to detect any triannulation of the outer piles in the fur except in a few black-tipped hairs on the middle of the back. The term "ears largely tipped with black," too, does not apply; the black tips, I should say, are rather narrow. But these are possibly individual differences, and the general colouration, a peculiar yellowish tint, well shown in the figure, coincides precisely, as does the distribution of colour. The dimensions correspond, except that "head 4 $\frac{3}{4}$ " must, I think, be too much, but it is not possible to tell how the head was measured. A skull over 4 inches long would be gigantic and quite out of proportion to the size of the animal.

These specimens from Eastern Tibet look at first very distinct from the Western skin obtained by Dr. Stoliczka, the latter being much more rufous and less yellow. But on close examination, this and the paler colour of the under-fur, which is silky-white on the middle of the back in the former skins, are the only distinctions, the distribution of colour and proportions are the same, and the skulls are very much alike; indeed, two skulls extracted from Eastern Tibetan specimens differ nearly as much from each other as either does from that of the Western Tibetan animal. Despite the difference in external appearance, therefore, I hesitate to consider these two forms distinct.

This western more rufous form may, of course, be Mr. Hodgson's *L. oiostolus*, which he says is the prevalent species in Ladák, but the type of that species was a very young animal not sufficiently mature for identification. Unfortunately, the name was the first given, and it is therefore important to recognize the species if possible.

The four specimens brought by Dr. Henderson from the first Yárkand Expedition, and described by Dr. Anderson in the Proceedings of the Zoological Society under the name of *L. tibetanus*, are quite immature, being scarcely half-grown. One is labelled Kárákásh, another Gogra hot-springs. The last, which is very young, probably belongs to *L. hypsibius*, the others to the present species; but the specimens are much too young for identification. They are paler in colour than adults, and the fur more woolly. I do not think any of them belongs to the true *L. tibetanus*.

These young hares, however, differ considerably in colour from an Eastern Tibetan specimen sent by Mr. Mandelli, which is more grey, and has, I think, still more woolly hair, thus suggesting the appropriateness of Mr. Hodgson's name *oiostolus*.

#### 42. LEPUS TIBETANUS. Pl. IV, fig 2.

*Hare of Little Tibet*, Vigne, Travels in Kashmir, &c., ii., p. 268.

*L. tibetanus*, Waterhouse, P. Z. S., 1841, p. 7.—Nat. Hist. Mam., Rodentia, ii, p. 58.—Günther, Ann. and Mag. Nat. Hist., 1875, Ser. 4, xvi, p. 228.

1, 2, Nubra valley, Ladák.

I should have been unable to identify this species but for Dr. Günther's having compared the hares obtained by Captain Biddulph in the Nubra valley with the type in the British Museum, which is, I suppose, that originally brought by Vigne from near Skárdo, and described by Waterhouse. Dr. Günther points out that the specimens from Nubra, although rather smaller in size, agree with the type very well, and may be distinguished from both *L. pallipes* and *L. oiostolus* of Hodgson by having straight, not curled, hairs.

The two specimens in the collection were both procured by Dr. Bellew; (Dr. Stoliczka did not traverse the Nubra valley). They differ so much from each other, that I was for a time disposed to consider them as belonging to distinct species, but there is no important difference between the skulls. Both were shot in October. The following is the description of the older specimen, which I suppose to be still in summer vesture. The skin has been slightly stained, and is rather more rufous than it should be.

General colour rufous brown (very dark-brownish tawny) above, white below; tail whitish below, sooty black above; face and anterior surface of ears like the back, tips of ears black, the colour running for some distance down the posterior margin.

Fur soft but short, scarcely an inch long on the middle of the back, very pale brownish at the base for about half its length (palest as usual in the middle of the back), then darker brown; towards the end pale rufous brown, the extreme tips being frequently black on the back. Neck and breast pale rufous; the basal portion of the hair browner. Head in front brown; cheeks rather paler; ears brown in front outside, pale brown behind, black at the tip and for some distance down the posterior margin; hair on the inside of the ear and on the anterior margin isabelline. The hair on the head and ears everywhere very short, so that the ears are almost naked inside. A light brown band down the front of the fore-leg, the exterior portion of thigh and tarsus the same colour: pads darker. Hairs of lower portion and sides of tail buffy<sup>1</sup> white throughout, those of the upper surface sooty black near the end, blackish ashy towards the base. Length of dried skin from nose to rump  $16\frac{1}{2}$ ; tail with hairs at end 4, without 3; tarsus to end of claws 2.75; ears outside, from the head between the ears, 4.5, from orifice 3.5; breadth laid flat 2.25.

The following is the description of the younger specimen which has been, I think, shot whilst assuming the winter coat. In midwinter, however, it would doubtless be paler and greyer, its dark brown colour being due to the newness of its fur. This is the specimen figured on Pl. IV.

General colour above dusky brown, with an ashy tinge on the rump, lower parts white; tail white, with a broad black band on the upper surface. The fur is very soft and short; the hair on the middle of the back being only three-quarters of an inch long, and on the rump  $1\frac{1}{4}$ . The dorsal fur is ashy at the extreme base, then very pale, hair brown; in the longer hairs towards the tip there is a dusky ring succeeded by a very pale rufous one, the extreme tip being black. Nape and neck above and at the sides pale rufous; breast similar but paler and duller. Head dusky brown; the hairs buff and blackish mixed, whitish round the eye and on the chin; whiskers mostly black, the apical portion of the longer and a few of the smallest lower hairs white. Ears thinly clad near the margins inside with whitish hair; a brown band near the posterior edge; the edge itself buff, the anterior edge with longer white hairs, anterior external portion of the ear mouse-brown, (finely mixed dusky and buff,) posterior portion very pale-brownish grey. Apex of the ear externally black; a line of the same colour runs forward for about an inch from the apex and just outside the posterior margin for about half-way down the ear. Limbs mostly white, a very light brown stripe down the front of the fore-legs. Length of skin (apparently stretched) from nose to rump about 20 inches; ear from head between the ears 4.25, from orifice 3.5; breadth laid flat 2.25; tarsus from calcaneum to end of claws 4.6.

<sup>1</sup> The colour is probably white, but the specimen with some others was packed damp and appears to have become stained. On this account the specimen has not been figured.

The following are the measurements of the skull, which is unfortunately imperfect. The skull of the other specimen is equally imperfect below and at the occiput:—

	Metre.	Inches.
Greatest breadth across posterior portion of zygomatic arches	.040	1.59
Width between orbits	.023	0.9
Length of nasal bones	.036	1.42
Width of do. behind	.017	0.67
Do. do. in front	.013	0.52
From base of (hinder) upper incisor to foremost molar	.023	0.9
Length of the six molars taken together	.0155	0.61
Do. of palate behind anterior palatine opening	.006	0.24
Breadth of do. between 3rd pair of molars	.0115	0.47
Height of lower jaw from base to coronoid process	.040	1.58

This hare is much smaller than *L. hypsibius*, and very differently coloured; the fur is much shorter and less woolly, and the tail has a broad black band above. The skull differs in several points. The palatine opening is much broader behind, the molars comparatively wider apart, muzzle shorter, the postorbital processes rise much less above the plane of the frontals, the lower edge of the zygomatic arch is nearly straight and not angulately convex, &c.

From the shortness of the fur I should have anticipated that this hare would be an inhabitant of a less severe climate than *L. pallipes* and the species hereafter described.

Recently specimens of a hare procured by Major Biddulph in Yassin near Gilgit, and closely approaching *L. tibetanus* in external characters, have proved, on examination of the skull, to belong to a different species, and have been described by myself as *L. biddulphi*.<sup>1</sup>

#### 43. LEPUS YARKANDENSIS. Pl. IV, fig. 1; Pl. IVa, fig. 2.

Günther, Ann. Mag. Nat. Hist., Ser. 4, xvi, p. 229.—W. Blanf., J. A. S. B., 1875, xliv., Pt. 2, p. 109.

Toskkhan, Yárkandi (Scully).

*L. parvus, affinis* Lepori tolai, sed multo minor, nusquam niger nec griseus, auriculis usque ad apicem concoloribus, haud nigris, arenaceo-isabellinus, fusco plusve minusve ad dorsum lavatus, lateribus lacteis, pectore pallidissime rufo, caudá albá, superne fuscá; vellere molli, longiusculo, ad basin cinereo. Long. a rostro ad basin caudæ 17, capitis 3.6, caudæ 4, auris 4.25, tarsi 4.25 poll.

1, 2, Yárkand; 3, Yangihissár; 4, skin, 5, skeleton, Kalti-ailák near Fyzabád; all localities in the plain of Yárkand and Káshghar.

General colour light brown or sand colour, above more or less mixed with dusky, becoming pale isabelline, almost cream colour on the sides, without any trace of grey on the rump; tail dark brown above; ears without any black at the end, though in one specimen there is a slight dusky tip; face and anterior portion of the ears the same colour as the back; lower parts, as usual, white; fur very soft and long, fine and woolly towards the base, and with numerous hairs rather longer than the rest, scattered throughout the body; these hairs have dusky tips on the back. The dorsal fur is pale grey at the extreme base for about a quarter of an inch, then pale rufous for at least half an inch; towards the end there is a dusky ring,

<sup>1</sup> J. A. S. B., 1877, xlvi, Pt. 2, p. 324.

and the points are pale buff, almost cream colour, but some of the hairs have blackish tips, which are in some specimens sufficiently numerous to produce a distinctly dark wash. The length of the fur on the middle of the back is about  $1\frac{1}{4}$  inches. On the sides and rump the hair is darker grey at the base, and the dusky ring near the tip is wanting. The hairs on the nape are pale rufous throughout, on the breast pale rufous to almost white, with the basal portion ashy. Hair of the face rather long, ashy at the base, then brown, becoming darker near the tip, which is generally very pale; some hairs, however, have black tips. Round the eye the fur is paler. Whiskers very few and inconspicuous, the upper black, the lower brown or white. Anterior external surface of ears the same colour as the face, posterior portion light isabelline or whitish. The apex in some is dusky, but in two specimens out of the four this is scarcely perceptible, and it is not black in any. Long hairs on anterior edge of ear white, those inside the ear of the same colour, but becoming buff towards the margin; the dark band near the posterior edge very faint. Fore-legs very pale brown in front; hind-legs still paler brown outside; pads rather darker, but variable as usual. Tail white below and at the sides, with a broad dark brown band above, the hairs of which are dusky grey at the base.

One striking peculiarity of this very pale coloured hare is the absence of any black patches and of all grey colouration throughout. All the specimens were shot in winter. The animal is very small, the following dimensions being from one of Dr. Stoliczka's labels to a Yarkand skin:—

	Inches.
Length . . . . .	17 <sup>1</sup>
Tail from vent. . . . .	4 <sup>2</sup>
Length of ear from base . . . . .	5.25
Greatest width of do. . . . .	2.8
Length of head . . . . .	3.6
Length of fore-foot. . . . .	2.15
Do. hind-foot . . . . .	4.25

In the skin the length from nose to rump of this specimen is 18 inches; ears from head between the ears 4.3; width of ear laid flat 2.25; tarsus 4 to 4.25. In the skeleton the skull measures 3.2 inches, vertebrae of neck and body 11.5, tail, consisting of 12 vertebrae, 3.25.

The following are the dimensions of a skull, (Pl. IVa, fig. 2.) It is very small, though fully adult, with peculiar short nasals, which are somewhat irregularly truncated behind near their outer margins, but slope away from the posterior end of the suture, where the frontals project forward in a point; each nasal is convex in front, the suture occupying a depression. The breadth behind the postorbital processes is greater than in the allied species, and the supraorbital expansion of the processes is smaller than usual in the genus:—

	Metre.	Inches.
Length from occiput to front of incisors . . . . .	.078	3.1
Breadth across zygomatic arches . . . . .	.037	1.45
Width between orbits across middle of postorbital processes . . . . .	.021	0.82
Do. of frontal bones behind do. . . . .	.014	0.55
Length of nasal bones . . . . .	.0285	1.13
Width of do. behind . . . . .	.0155	0.61
Do. do. in front . . . . .	.01	0.4
Length of six upper molars taken together . . . . .	.014	0.55

<sup>1</sup> This, I think, does not include the tail.

<sup>2</sup> Evidently the hair at the end is included.

		Metre.	Inches.
Length of palate behind palatine opening . . . . .		.005	0·2
Breadth of palate between 3rd pair of molars . . . . .		.011	0·42
Length of palatine opening . . . . .		.0185	0·72
Do. of lower jaw from angle to symphysis . . . . .		.054	2·13
Height of do. . . . .		.036	1·42

This species approaches *L. tolai*, Pallas, but is much smaller with proportionately longer ears. It appears to be the common species of the Káshghar and Yárkand plains, and may very possibly be the hare noticed by Prejevalski near Lake Lob.

44. *LEPUS PAMIRENSIS*. Pl. V, fig. 1; Pl. Va, fig. 1.

W. Blaaf., J. A. S. B., 1875, xliv, Pt. 2, p. 110.—Günther, Ann. Mag. Nat. Hist., 4, xvi, p. 229.

*L. supra arenarius vel fusco-isabellinus, infra albus, uropygio albescenti-cinereo; caudá superne nigrá; auricularum marginibus superioribus extus nigris; pectore pallide rufo; vellere denso, molli, ad basin, præter ventrali, cinereo; pilis longioribus ad dorsum nigro-terminatis intermixtis. Long. a rostro ad basin caudæ circiter 18, caudæ 4, auriculæ a basi anticá 5, ejusdem latitudo 2·75, cranii longitudo 3·5, tarsi 5 poll.*

1, 2, Lake Sirikul, Pámir.

General colour very pale sandy-brown, almost isabelline on the back and sides; rump greyish white; tail black above; face and anterior portion of the ears the same colour as the back; terminal portion of ears black outside the edge; breast light rufous; lower parts, as usual, white. Fur fine, close and soft, consisting at the base of fine woolly fibres mixed with coarser hairs, the former slaty-grey for about half an inch, then pale-rufous passing into dusky-brown, the tips being sandy. Throughout the fur coarser and longer piles are scattered; these are white near the base on the back, showing conspicuously amongst the grey under-fur, and black at the ends. The basal portion of the fur is darker on the rump, sides, and shoulders, than on the middle of the back. There are no black or dusky tips to the fur in general on the back, but only to the scattered longer hairs. Length of ordinary hairs on the middle of the back 1 to  $1\frac{1}{4}$  inches, longer piles  $\frac{1}{2}$  to  $\frac{3}{4}$  inch more. On the rump, as usual, the hair is longer. The nape, sides of the neck and breast are pale rufous, or rufescent isabelline, the hairs being slaty-grey at the base. Face and sides of head pale sandy-brown, nearly the same as the back, with longer black piles scattered throughout the fur; hairs slaty at the base, then brown, tips sandy; a very distinct white line from the upper lip to behind the eye, which it includes; chin and upper part of throat pure white. Ears sandy brown on the anterior outer surface, nearly the same colour as the face, anterior margin white, posterior outer surface creamy-white, becoming rufous near the base; outer margin at the apex and for a varying distance down the hinder margin black or blackish.<sup>1</sup> Hair on inside buffy-white, except the band near the posterior margin, which is brown. Fore-legs in front and hind-legs outside with a light brownish tinge; pads much darker. Hairs of the tail white throughout their length below and on the sides, black throughout above. Both animals were shot on May 1st. They do not appear to have lost their winter coats.

<sup>1</sup> This probably varies with the season; it is more distinct in one specimen than in the other.

The following dimensions were marked by Dr. Stoliczka on one of the labels, and were doubtless taken on the fresh animal :—

	Inches.
Length of head and body . . . . .	17·5 <sup>1</sup>
Do. of tail . . . . .	4 <sup>2</sup>
Do. of head from snout to occiput . . . . .	4·2
Do. do. to eye . . . . .	2·2
Do. of ear from front base . . . . .	5
Greatest width of ditto . . . . .	2·75
Fore-foot . . . . .	2·6
Hind-foot . . . . .	5·3

The skins measure about 18 inches from nose to rump, tail with hair 4, ears from head between the ears 4·5, from orifice 3·6, tarsus to end of claws 4·8 to 5.

The following are the dimensions of a skull (Pl. Va, fig. 1) :—

	Metre.	Inches.
Length of skull from occiput to front of incisors . . . . .	·089	3·5
Greatest breadth across zygomatic arches . . . . .	·041	1·6
Width between orbits . . . . .	·026	1·03
Length of nasal bones . . . . .	·038	1·51
Breadth of do. behind . . . . .	·018	0·75
Do. do. in front . . . . .	·013	0·5
From the base of the hinder upper incisor to foremost molar . . . . .	·026	1·05
Length of the six molars taken together . . . . .	·016	0·65
Do. of palate behind palatal opening . . . . .	·007	0·25
Breadth of do. between 3rd pair of molars . . . . .	·012	0·46
Length of lower jaw from angle to symphysis . . . . .	·059	2·31

The skull very much resembles that of *L. tibetanus*; the nasal bones have the same form, but the skull is larger in all its dimensions; the posterior portion of the frontal bones is more convex, and the breadth of the cranium behind the postorbital processes greater. The external colouration and fur are very different and are nearer to those of *L. yarkandensis*. *L. pamirensis* is distinguished from that species by the black upper portion of the tail, by the grey rump, and by the admixture of longer piles, black at the end, on the back. The present species is also larger, though still inferior in size to *L. tolai*, from which it is distinguished, moreover, by its longer ears. Dr. Günther especially notices the “extraordinarily dense and comparatively long and stiff fur” on the front part of the ears in this species, and the density of the short, stiff fur on the back.

*L. pamirensis* is very possibly peculiar to the high Pámir plateau. It has some resemblance to *L. biddulphi*, the Gilgit species.

#### 45. LEPUS STOLICZKANUS. Pl. V, fig. 2; Pl. Va, fig. 2.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 110.

*L. præcedenti peraffinis, arenario-fulvus, differt tantum auriculis multo longioribus, vellere dorsali nigro lavato. Long. corii desiccati a rostro ad basin caudæ 17·5, caudæ*

<sup>1</sup> The number on the label appears to be 11·5, but this is palpably not intended.

<sup>2</sup> Probably the hair at the end is included.

(vertebrarum) 3, ejusdem cum pilis apicalibus fere 5, cranii 3.5, auriculæ extus 5.2, tarsi 4.9.

1, 2, Jigda, Altum Artush district, N.-E. of Káshghar.

This species is very close to *L. pamirensis*, but appears to be distinguished by its much longer ears, by wanting the distinct white cheek bands, and by having black tips to the dorsal fur, producing a blackish wash on the back. The fur is rather softer, and the colouration of the underfur darker.

The general colour above is light sandy-brown, much mixed with black on the back; the rump very little paler; tail rather long, black above; face and anterior portion of ears the same colour as the back; terminal portion of ears black outside; nape and breast light rufous, lower parts white. Fur soft and long, consisting, as in the last species, of two kinds, the one woolly and fine at the base, the other longer, coarser and straight throughout; throughout the upper parts the fur is ashy at the base for about three-quarters of an inch (the colour being much darker and slaty on the shoulders, sides and rump, paler in the middle of the back), then brown for half an inch, light at first, becoming darker away from the body, the portion near the end is sandy-brown, and the tip itself in many hairs black on the back only. The longer scattered hairs are white at the base, and conspicuous amongst the finer grey woolly fur, and have the distal portion black. Length of ordinary fur on the back 1½ inches, the longer piles half an inch more. Nape, back and sides of neck and breast pale rufous; the hairs dark slaty at the base, but this colour on the nape is only perceptible quite close to the skin. Face sandy-brown, fur slaty at base, then chocolate-brown; the tips very pale sandy; longer black piles are scattered throughout. A faint line from the nose to the eye, and hair around the eye pale, but there is no distinct white band. Upper and shorter whiskers black, lower long whiskers white, black near the base. Ears in front sandy brown like the face; hair on the anterior edge white; posterior portion of outer surface pale rufous or buffy-white, near the tip black, this colour running as a narrow line for some distance down the posterior margin. Hair inside the ear mostly white, buff towards the edge, darker band inside the posterior edge dusky brown, not much developed. Hind-legs on outside, and fore-legs in front, pale sandy rufous; pads darker. Hair of tail white throughout below and on the sides, black throughout above.

The following are the dimensions of the skins: length, nose to rump, 17.5; tail (vertebræ), 3; hair at end of tail, 2; length of ears from head, 5.2; length of ears from orifice, 4.25; breadth of ears laid flat, 2.5; tarsus to end of claws, 4.9.

The skull (Pl. Va, fig. 2) differs much both from that of *L. yarkandensis* and that of *L. pamirensis*, the nasals being much more abruptly truncated behind than in either, and the parietal region or sinciput flatter. The size is about the same as that of the latter. The following are the dimensions, the length being only approximate, as the occipital portion in both specimens is imperfect.

	Metre.	Inches.
Length about	. . . . .	.090 3.55
Breadth across zygomatic arches	. . . . .	.041 1.62
Width between orbits	. . . . .	.024 0.93
Do. of frontal bones behind postorbital processes	. . . . .	.013 0.52
Length of nasal bones	. . . . .	.036 1.42
Width of do. behind	. . . . .	.017 0.66
Do. do. in front	. . . . .	.0105 0.41

		Metre.	Inches.
Length of six upper molars taken together	.. . . .	·016	0·62
Do. of palate behind palatine opening	.. . . .	·006	0·25
Breadth of palate between 3rd pair of molars	.. . . .	·012	0·48
Length of palatine opening	.. . . .	·022	0·88
Do. of lower jaw from the angle to the anterior alveolar margin	.. . . .	·0625	2·47
Height of do.	.. . . .	·037	1·48

This species inhabits the outer hills of the Thian Shan range north and north-west of Káshghar, and is frequently referred to in Dr. Stoliczka's diary; it appears to be very abundant.

*Lepus stoliczkanus* is perhaps allied to *L. lehmanni* of Severtzoff,<sup>1</sup> the hare of Western Turkestan. The latter, however, is described as having the ears but little longer than the head.<sup>2</sup> The colouration, too, presents several differences, as will be seen from the following description of *L. lehmanni*: "The colour is just like that of *L. timidus*,<sup>3</sup> the shoulders and back are yellowish grey brown; each hair is marked with black and light yellowish-brown rings; the flanks are lighter, in summer they are yellowish-grey, and ash coloured in winter, the nose, cheeks and tip (? top) of the head are grey; the nape of the neck is greyish yellow, with soft unicolorous hair; the throat and breast as far as the front legs are greyish yellow, the hair being brownish yellow with grey tips; in summer the underfur on the coloured portions of the animal is light brown grey, and in winter grey; the tail is white with a broad black line on the upper portion; the belly is white. The ears are greyish white with a wide centre line of the colour of the back on the exterior, and with a narrow black edge on the terminal half of the ear."

The colour of the neck in *L. stoliczkanus* is pale rufous, not greyish yellow, and the ears are very light brown, not greyish white; besides several other differences.

The other hares hitherto described from Central Asia, besides Hodgson's two species already mentioned, *L. oïostolus* and *L. pallipes*, are *L. timidus*, L., (*L. variabilis*, Pal.) and *L. tolai*, both of which are found, according to Pallas, (Zoog. Ros. As. I., p. 149,) in the Trans-Baikal region and the deserts of Mongolia; and *L. hybridus*(?) from the Altai mountains. We have as yet no satisfactory information as to the hare or hares found in Afghanistan and Northern Persia.

No species is enumerated amongst the animals brought from Eastern Tibet by Père David, and described by M.M. Milne-Edwards,<sup>4</sup> whilst the only form observed by the same traveller in Northern China was *L. tolai* (Nouvelles Arch. du Mus., 1867, Vol. III, Bulletin, p. 27). Further to the north-east a hare was found by Radde and described as *L. mandshuricus*,<sup>5</sup> and from Eastern or South-Eastern China another form is known, *L. sinensis*.<sup>6</sup> In the 'List of the specimens of mammalia in the British Museum' (1843), p. 126, a *Lepus altaicus*,

<sup>1</sup> Turk. Jev., p. 83; Ann. Mag. Nat. Hist., Aug. 1876, Ser. 4, Vol. xviii, p. 169.

<sup>2</sup> In the original description of *L. stoliczkanus* I stated that the ears in *L. lehmanni* were the same length as the head. In the complete translation of Severtzoff's descriptions subsequently published in the Annals and Magazine of Natural History, l.c., the ears are said to be "longer than the head: if bent forward along the side of the head, they extend beyond it about 6—7 lines." The dimensions of the ears in the dried specimens of *L. stoliczkanus* show that the difference in length in this species would be much greater.

<sup>3</sup> That is the *L. europaeus* of Pallas, *L. timidus* of some modern authors, not of Linnæus. The true *L. timidus* of Linnæus is, of course, *L. variabilis* of Pallas.

<sup>4</sup> Nouv. Arch. Mus., 1871, vii, Bull. p. 90.

<sup>5</sup> Radde, Bull. Acad. St. Pet., 1861, iv, p. 52.

<sup>6</sup> Gray and Hardwicke, Illustrations of Indian Zoology; see also Blyth, J. A. S. B., 1861, xxx, p. 90.

is quoted with, as synonym, *L. variabilis altaica*, Everm. (*sic.*) ; and again, in Gray's notes on the skulls of Hares, &c., in the British Museum, a *Lepus altaicus*, Brandt<sup>1</sup> is mentioned. This is doubtless *L. altaicus*, Gray, of Fitzinger<sup>2</sup>. Neither writer gives any reference, and I can find no description of the species by either Brandt or Gray. Waterhouse in his *mammalia*<sup>3</sup> identifies the specimen thus named, which is said to be from the Altai mountains, with *L. hybridus*, Desm. The specimen in the British Museum was from M. Brant's (? Brandt's) collection, and the locality is therefore possibly correct, but I cannot but think that Waterhouse's identification needs confirmation.

Family—*LAGOMYIDÆ*.

46. *LAGOMYS LADACENSIS*. Pl. VI, fig. 1 ; Pl. VII,<sup>4</sup> fig. 2 ; Pl. VIIa, fig. 1.

Günther, Ann. Mag. Nat. Hist., Ser. 4, xvi, p. 231.—W. Blanf. J.A.S.B., 1875, xliv, Pt. 2, p. 110.  
*Lagomys curzonæ*, Stoliczka, J.A.S.B., 1865, xxxiv, Pt. 2, p. 108.—Anderson, P.Z.S., 1871, p. 562,  
*nec* Hodgson.

*Zabra, Karin* or *Phise karin*, Ladák.

*L. major, pallide cervinus, seu rufescenti-fulvus, dorso in æstate magis rufescente, auriculis rotundatis, majusculis, extus ferrugineis, velleris dorsalis dimidio basali nigrescenti-plumbeo, apicali primum rufescente, tunc demum albescenti-isabellino, pilis nonnullis longioribus nigris ad dorsum intermixtis, ventre pedibusque pallide fulvis, capite antice rufescente, vibrissis superioribus nigris, inferioribus albis. Long. tota circa 9, cranii 2:25, auriculæ 1, tarsi 1:5 poll.*

1, skin, Chágra, north of Pangong lake ; 2, 3, 4, skins, 5, skeleton, Rimdi, 17,000 feet ; 6, skin, Kiziljilga, (both the two last localities are on the high plateau north of Ladák) ; 7, 8, skins without labels, probably from Gogra, north of Rimdi.

Some years ago, when describing the *Lagomys* from Upper Sikkim,<sup>5</sup> I pointed out that it agreed much better with Mr. Hodgson's description of *L. curzonæ* than did the Ladák species referred to the latter by Dr. Stoliczka. Mr. Hodgson's types were presented to the British Museum, and Dr. Günther has recently examined them, and finding that my suggestion was correct, and that the Ladák species is different, he has named the latter *L. ladacensis*.

Dr. Stoliczka's description is excellent and is here copied. He states that it is founded on four specimens, of three of which exact measurements are given :—

“ General hue of the upper body pale buff, fulvous, with very slight rufous tint and tipped with dark brown ; below whitish, with translucent dusky blue. The larger hairs of the fur measure about  $\frac{7}{8}$ th of an inch ; the lower part, for more than half their length, of a dark, slaty-blue colour, with silky lustre ; the next portion pale fulvous, and the tip dark-brown or black. The fur is full and very soft, as Hodgson remarks, and can be readily distinguished from that of *L. rufescens*, Gray. Chiefly in old specimens, there are, on the sides

<sup>1</sup> Ann. Mag. Nat. Hist., 1867, Ser. 3, xx, p. 223.

<sup>2</sup> Sitzb. K. Akad. Wiss. Wien. Math. Nat. Cl., 1867, lvi, 1 Abt. p. 165.

<sup>3</sup> Rodentia, ii, p. 45.

<sup>4</sup> In plates VI, VII representing this species and *L. auritus*, a mistake has been made. It was proposed to figure *L. ladacensis* in summer and winter vesture, on Pl. VI. The lower figure in Pl. VI is *L. ladacensis* in winter dress, but is somewhat too dark ; the upper figure is *L. auritus*. Figure 2, Pl. VII, is *L. ladacensis* in summer dress. The colouration of both figures in Plate VI is unsatisfactory, the lower figure should be much more buff, the upper figure browner and less yellow.

<sup>5</sup> J.A.S.B., 1872, xli, p. 35.

of the upper portion of the body, a few long hairs intermingled, which measure up to one and a quarter inches; these are almost or entirely of a black colour.

On the lower part of the body the hairs are, for two-thirds of their length, dark slaty-blue, and the rest pale.

The head measures nearly always one-fourth<sup>1</sup> of the total length of the animal. The hairs on it are much shorter, and tinged with a dark rufous tint above; on the sides of the snout they are pale grey; in front of the eyes and below, pale white; while on the sides of the head itself there is a slight rufous tint marked, which is a little stronger all round the neck, and extends somewhat further back on the upper body. The hairs round the neck are rather longer, but only half their length of the slaty colour, the rest being pale rufous; but a few of them are tipped with black.

The end of the snout and of the upper and lower lips are dark blackish. The hairs of the moustaches are very long, some of them measuring three inches; the upper ones are chiefly black; the lower white or half black, half white. The ears are comparatively rather large, oval, terminating with a very obtuse point; they are well covered with hair, thickest on the outside: the hairs on the inner surface being pale yellow, those on the outer much longer and softer, and distinctly rufous. The feet and soles are, in accordance with the general hue, of a pale fulvous colour, only still lighter, and slightly, and only partially, tinged with a rusty tint; the toes are black, claws long and dark-brown.

The young animal does not differ in colour very much from the old one. It is usually much paler, and the difference between the hue on the upper and lower portions of the body is far less distinctly marked. The slaty hue of the inner fur is also more translucent, and the rufous tint on the head and the hinder part of the ears not so strong.

The measurements, in inches, of three specimens from Rupshu, the eastern province of Ladak, are as follows:—

	(a).	(b).	(c).
Total length of the animal	7.50	9.00	9.50
Length of the skull	1.90	2.25	2.37
Proportion of the length of the skull to the total length	0.26	0.25	0.25
Width of the skull	0.87	1.25	1.25
Porportion of width to length of the skull	0.46	0.55	0.52
Length from the snout to the eye	0.75	1.00	1.00
Length from the eye to the ear	0.93	1.12	1.12
Length of the ear	0.62	1.06	1.00
Width of the ear	0.56	0.87	0.81
Proportion of the width to length of the ear	0.90	0.82	0.81
Length of fore-foot and nails	0.87	1.12	1.12
Length of the hind-foot and nails	1.25	1.50	1.43

(a) Young specimen from above the Gyagar lake in Rupshu.

(b) An old, full-grown specimen from near Kozak on the Chomoriri lake in Rupshu.

(c) Judging from the teeth, this seems to be a very old specimen, from the east side of the Lanak pass, west of Hanle.

This latter specimen has the fur considerably worn off and injured. I found in the skin of this and some other specimens, which I shot in the Puga valley, a great number of larvæ of an *Estrus*, which causes the injury and a sort of roughness of the fur.<sup>2</sup> As the tips of the hair get worn off, the hue becomes in some places dark spotted, which is caused by the slaty colour of the interior portions.

It will be seen from the given measurements that the skull of the young animal is, in proportion to the entire body, a little longer and broader than that of the adult, and the ears are also somewhat larger (? smaller). These proportions may be often observed in mammalia of different ages.

*Lagomys curzonæ* is one of the largest known species of the genus. Our largest specimen measures 9½ inches, which is only one line less than the greatest measurement of *Lagomys alpinus*, Pallas. (Vide Water-

<sup>1</sup> One-fifth in the original, but this is evidently, from the measurements, a slip or misprint.

<sup>2</sup> Anderson, P. Z. S., 1871, p. 563, says the worn condition and roughness of the fur is noticed on those parts which are most exposed to become rubbed, as on the lumbar region, rump and sides, and he rejects Stoliczka's explanation. But it should be borne in mind that Stoliczka made his observations on fresh animals.

house, *Mammalia*, Vol II, *Rodentia*, p. 16). Mr. Hodgson's specimens were much smaller, and probably younger.<sup>1</sup> I observed several which were not longer than seven inches, but most of them were about nine inches long.

The people of Korzak called *L. curzonae*, *Phise-karin*, which means, as I was informed, *tailless Phise*. *Phise* or *Pheeese* is the name of *Phaiomys leucurus*,<sup>2</sup> which lives here associated with the *Lagomys* and *Arctomys*. The name *Phise-karin* I was told is Tibetan, and the Ládak name for *L. curzonae* is *Sabra*. Hodgson gives the name *Abra*; it is, however, well known that the letter *s* before many words is, in some parts of Tibet, pronounced; in others, not so.

The first place where I met with *L. curzonae* was a little above the junction of the Chomoriri with the Para valley at a height of about 15,500 feet above the level of the sea. It does not live usually at a lower elevation than this; and if otherwise, as in the lower parts of the Puga valley (14,500 feet), it is always scarce. Round the Chomoriri lake, where there is comparatively plenty of vegetation, it is associated with *Phaiomys leucurus*, Blyth, and *Arctomys bobac*, Schreber.

*L. curzonae* ranges, however, somewhat higher. I noticed it on the top of the Lanak pass at an elevation of 18,672 feet, where only two minute plants existed—*Stracheya tibetica*, Bth., and *Capsella thomsoni*, Hf.—both flowering in August. It is found associated with *Corvus tibetanus*, Hodgs., *Gyps fulvus*, Gmel., and a new species of *Procarduelis*, among birds; an *Argynnis* among butterflies, and some common flies, forming the highest observed animal life in these hills. In fact, it is difficult to assign a limit to the height up to which *L. curzonae* lives. I believe it ranges as high as any trace of vegetation exists, which would be here about 19,000 feet, or very near it. Between the two given limits of the Para valley and 19,000 feet, it is seen in great abundance all over the eastern portion of Ladak. It is certainly the species of Adams and Cunningham, as there is to my knowledge no other *Lagomys* here,—at least, none so common. Its geographical range must extend farther to the east and south-east, as Mr. Hodgson obtained his specimens from the district of Chumbi (north-west of Sikkim ?). I have not observed it south of the Baralatse range, either in Spiti or in the south-eastern part of Lahoul, the Chandra valley; although *Phaiomys leucurus* does occur in both provinces, and even in Kulu. In Spiti, *Lagomys curzonae* is represented by the smaller *L. roylei*, Ogilvy, which there lives between 12,500 (above Lari) and 16,000 feet, but usually about 13,000 feet.

From a comparison of the fine series of specimens in the Indian Museum brought back by the first Yákand Expedition with those now obtained, it is clear that there is a considerable difference between the summer and winter coat of this species. All the specimens now obtained, except the two supposed to be from Gogra, have evidently acquired their winter fur: the two without labels are undergoing the change; they have the long pale-coloured winter fur on their shoulders and rumps, but have not acquired it elsewhere. Of the specimens obtained by the former Expedition, all but one were killed in summer, whilst a single specimen procured in October agrees with the other skins collected in the same month and in September. The following are the distinctions:—

*Summer Coat*.—Fur shorter and very soft, the pale tips not more than a quarter the length of the hairs; general tinge often rufous on the face and back; hair frequently considerably worn, especially on the back, so that the dark basal portion shews.

*Winter Coat*.—Fur longer and less soft, the pale tips nearly half the length; general colour rufescent fawn with a slightly greyish tinge; dark basal portion of the fur entirely concealed, except on the abdomen; outside of ears alone distinctly rufous, though there is a slight wash on the face. At this season the hairs on the soles are much longer, and the pads of the toes are sometimes completely concealed.

<sup>1</sup> Hodgson, however, especially states that his specimens were ascertained to be adult by an examination of the teeth, J. A. S. B., 1857, xxvi, p. 207.

<sup>2</sup> *Phaiomys Cucurus*, Schreber, in the original. Doubtless *Phaiomys leucurus*, Blyth, is meant, the specific name being a misprint.

The skull of *L. ladacensis* differs entirely from those of *L. roylei* and *L. rufescens*, and appears to approach those of *L. alpinus* and *L. ogotona*.<sup>1</sup> As in the last named species, the maxillary bones approach each other so as nearly, but not quite, to isolate the front portion of the anterior palatine opening from the longer portion between the anterior molars. The nasals are much narrower behind than in front, and rather convex anteriorly; the orbits close together, the sinciput flattened, the occipital plane low and broad, and the rows of upper molar teeth considerably curved inwards in front.

The following are dimensions of a skull:—

	Metre.	Inches.
Total length . . . . .	.048	1.9
Breadth across zygomatic arches . . . . .	.024	0.95
Do. between orbits . . . . .	.0035	0.14
Length of nasal bones . . . . .	.016	0.62
Breadth of do. behind at posterior end of premaxillaries . . . . .	.0035	0.14
Do. do. in front where broadest . . . . .	.006	0.24
Longitudinal diameter of bony orbit including temporal portion . . . . .	.014	0.55
Transverse diameter of do. . . . .	.0105	0.43
Length of 5 molars in upper jaw taken together . . . . .	.01	0.4
Distance from anterior molar to hinder incisor . . . . .	.012	0.45
Breadth of palate between last pair of molars . . . . .	.008	0.32
Length of palate behind palatine opening . . . . .	.002	0.08
Length of palatine opening . . . . .	.014	0.55
Breadth of do. behind . . . . .	.004	0.17
Length of lower jaw from angle to symphysis . . . . .	.033	1.29
Height of do. . . . .	.019	0.75

Unfortunately Dr. Günther has only described the external characters of the true *L. curzonae*, and it is uncertain whether the skull is like that of *L. ladacensis* or that of *L. roylei*, &c., but the latter is more probable.

To the account of the distribution of this *Lagomys* already quoted from Dr. Stoliczka, it is only necessary to add that it appears to be extremely common on the plateau north of Ladák. It was not observed in the Indus Valley, nor on the Pankong lake, nor is it noticed in Dr. Stoliczka's diary before reaching Chágra, north of the Pankong lake.

#### 47. LAGOMYS AURITUS. Pl. VI,<sup>2</sup> fig. 2; Pl. VIIa, fig. 2.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 111.

*L. superne sordide fulvus fusco-lavatus, capite humerisque rufescens, auriculis magnis, rotundatis, pilis isabellinis indutis, vellere molli, pilis basin versus nigrescenti-plumbeis, apices versus in dorso lateribusque isabellinis, fusco-terminatis, subtus albis. Long. (in corio dessicato) tota circiter 7.5, cranii 1.8, auris 1, tarsi 1.2 poll.*

1, skin; 2, skeleton, with flat skin; Lukong, on the Pankong lake.

General colour above smoky or wood-brown; the head, shoulders and rump rather paler and more rufous; lower parts whitish, with the dark basal portion of the hair shewing through.

<sup>1</sup> This species is made the type of a distinct genus, *Ogotona*, by Gray, Ann. Mag. Nat. Hist., 1867, Ser. 3, xx, p. 220. The characters given, entirely drawn from the skull, appear to be scarcely of generic value.

<sup>2</sup> See foot-note p. 71.

Fur very soft, moderately long, about 0.9 inch long on the middle of the back, without any scattered longer hairs, black and glossy (leaden black) at the base on the upper parts, somewhat more slaty on the sides and below, distal portion of the dorsal hairs whitish, tips dark-brown; the same on the sides; on the abdomen the tips of the hair are white; on the head the basal portion of the hair is light slaty-grey, the tips rufous. Ears large, round, clothed rather thinly inside near the margin with whitish-brown hairs, and outside with much longer hairs of the same colour. Whiskers fine and long, the upper dark-brown, the lower white. Feet whitish.

The skin measures about 8 inches in length, the skeleton 7 (the living animal would be rather more); the ears in the dried skin an inch in length or rather more, and the same in breadth; tarsus to end of claws 1.2; carpus to end of claws 0.7.

In the skull the anterior and posterior portions of the anterior palatine foramen are united, without any tendency to a constriction between them. The nasal bones are much narrower than in *L. roylei*, and the sincipital portion is more convex; otherwise there is much resemblance between the two.

The following are the dimensions of the skull of *L. auritus* :—

	Metre.	Inch.	Metre.	Inch.
Total length . . . . .			.044	1.73
Do. breadth across zygomatic arches . . . . .	.021	0.82	.0215	0.85
Length of nasal bones . . . . .	.0155	0.6	.016	0.63
Width of do. behind . . . . .	.0045	0.18	.0045	0.18
Do. in front . . . . .	.0055	0.22	.0065	0.26
Do. of frontal bones between orbits . . . . .	.005	0.2	.005	0.2
Longitudinal diameter of orbits (including temporal portion) . . . . .	.011	0.44	.0115	0.46
Transverse diameter of do. . . . .	.0095	0.38	.010	0.4
Length of palatine opening . . . . .	.012	0.47	.013	0.52
Antero-posterior diameter of bony palate behind palatine opening . . . . .			.002	0.07
Width of palate between last pair of molars . . . . .	.0075	0.3	.007	0.28
Length of the 5 upper molars taken together . . . . .	.009	0.37	.009	0.35
Length of lower jaw from angle to symphysis . . . . .			.028	1.12
Height of do. . . . .			.017	0.67

This species differs from *L. roylei* by its much larger ears and by its colour, which is lighter. It probably is found in other parts of Ladák.<sup>1</sup> Skins obtained at Gilgit and in the Kishengunga valley by Captain Biddulph,<sup>2</sup> however, appear to be intermediate in characters between *L. roylei* and *L. auritus*.

#### 48. LAGOMYS MACROTIS.

Günther, Ann. Mag. Nat. Hist., 1875, Ser. 4, xvi, p. 231.

1, Skin without label.

There is a single specimen, without a label, of a *Lagomys* with the fur in poor condition, in the collections made by Dr. Stoliczka. It has evidently been shot when shedding its long

<sup>1</sup> Some specimens of *Lagomys* noted in Dr. Stoliczka's list of his collected specimens as having been procured at Matayan near Drás, Khárbu, Leh and Chagra, are not forthcoming.

<sup>2</sup> J. A. S. B., 1877, xlvi, Pt. 2, p. 326.

winter fur; and as Dr. Stoliczka mentions in his diary that he obtained a *Lagomys* with the fur very ragged on the 6th of June at Dúba, and as this specimen agrees well with Dr. Günther's description of the type of *L. macrotis*, obtained by Captain Biddulph at the same spot, I have no hesitation in concluding that the skin without a label is from Dúba. It is the only skin in the whole collection which presents the appearance of having been killed when just losing its long winter fur. Dúba is a camping ground at an elevation of 10,440 feet on the north side of the Kuenlun, on the road from Yárcand to Yangi Diwán and the Kárakoram pass *via* Kugiár.

Although I felt very doubtful about it, I referred this skin to *L. auritus* until I saw Dr. Günther's description, which is evidently taken from a specimen in better condition. It runs thus :

Fur very soft and long, especially on the hind part of the back; general hue of the upper parts pale buff yellow, whitish on the sides and underneath; a small white patch behind the ear; feet pure white; chin white; the hairs of the moustaches white, but some of them black. Apparently no glandular patch below the ear. Ears very large, well covered with hairs. Soles of the feet covered with short hairs, leaving the pads of the toes quite bare.

	Inches.
Total length . . . . .	8
Length of ear . . . . .	$1\frac{1}{8}$
Length of tarsus, including nails . . . . .	$1\frac{3}{8}$

In the specimen collected by Dr. Stoliczka, the long hair on the back is leaden-black at the base and for the greater portion of its length, then dirty white, the ends being buff, and a few hairs having black tips. But the new short fur which is growing between the patches of the long hair is brownish, precisely as in *L. auritus*. I am strongly disposed to suspect, indeed, that *L. auritus* is the summer, *L. macrotis* the winter garb of the same species; but there are one or two differences which require explanation. The feet appear larger in *L. macrotis*, and the pads of the toes are black, whilst in *L. auritus* they are pale coloured: in the former the long hair of the forehead is lead black at the base, in the latter pale grey. The feet and lower parts generally are white in *L. macrotis*, buffy white in *L. auritus*; but this may be seasonal.

The skulls are very similar. From the imperfect skull extracted from the skin of the specimen referred to *L. macrotis*, I take the following measurements :—

	Metre.	Inches.
Total breadth across zygomatic arches . . . . .	·02	0·81
Length of nasal bones . . . . .	·016	0·63
Width of do. behind . . . . .	·005	0·2
Do. do. in front . . . . .	·0055	0·22
Do. of frontal bones between orbits . . . . .	·005	0·2
Longitudinal diameter of orbit . . . . .	·012	0·48
Transverse diameter of do. . . . .	·01	0·39
Length of palatine opening . . . . .	·013	0·54
Antero-posterior diameter of bony palate behind palatine opening . . . . .	·002	0·07
Width of palate between last pair of molars . . . . .	·009	0·35
Length of 5 upper molars taken together . . . . .	·009	0·35
Length of lower jaw from angle to symphysis . . . . .	·03	1·2
Height of do. . . . .	·017	0·7

## 49. LAGOMYS GRISEUS, Pl. VII, fig. 1; Pl. VIIa, fig. 3.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 111.

*L. sordide griseus, subitus albus, ad dorsum frontemque leviter rufescens lavatus, vellere elongato, molli, ad basin plumbeo-nigro, apices versus in dorso lateribusque griseo, apicibus ipsis nonnullis fuscis; auribus magnis rotundatis, pilis sparsis albidos induit. Long. in exemplo nuper occiso 7, capitis 1.75, auris 1.4, tarsi 1.3 poll.*

1, 2, south of Sánju Pass, south of Yárkand, Kuenlun Range.

General colour dull-grey (almost chinchilla colour) with a slightly rufescent tinge on the face and back, lower parts white. Fur very soft, about 0.9 inch long in the middle of the back, glossy leaden black at the base, and for about two-thirds of its length very pale, ashy-grey towards the end, the extreme tips of many hairs dark-brown, and on the back the tips of all the hairs are brownish. The sides are almost pure light ashy, rump still paler, feet white. Hair on the face long, on the forehead about half an inch, the basal portion black, the terminal portion light-brown on the forehead, greyer on the nose, and pure grey on the sides of the head. A few of the upper whiskers are black, all the longer and lower vibrissæ white throughout. Ears large, round, with rather thin white hairs inside, very short hairs close to the margin, white on the outside, black on the inside, outer surface covered with whitish hairs which become long near the base of the ear.

The following measurements are taken from one of the tickets, and consequently are doubtless those of the animal when freshly killed; the measurements from the dried skins are added for comparison with other species:—

	Fresh specimen.		Dried skins.	
	Inches.		Inches.	
Total length	.	.	7	6.5 to 7.5
Length of ear	.	.	1.4	1.1
Width of do.	.	.	1.3	1.
Length from nose to eye	.	.	0.9	
Do. do. to base of ear	.	.	1.7	
Do. fore-foot	.	.	0.8	0.8
Do. hind-foot	.	.	1.3	1.3

The following are the measurements of a skull barely adult:—

	Metre.	Inches.
Total length	.044	1.75
Do. breadth across zygomatic arches	.022	0.86
Length of nasal bones	.0155	0.6
Width of do. behind	.005	0.2
Do. do. in front	.0055	0.22
Do. of frontal bones between orbits	.006	0.23
Longitudinal diameter of orbit	.011	0.45
Transverse diameter of do.	.009	0.36
Length of palatine opening	.013	0.52
Breadth of do. behind	.006	0.23
Antero-posterior diameter of bony palate behind palatine opening	.002	0.08
Width of palate between last pair of molars	.0075	0.3
Length of five upper molars taken together	.009	0.36
Do. of lower jaw from angle to symphysis	.029	1.12
Height of do.	.017	0.7

A comparison of these measurements with those given for *L. auritus* will show how very close they are to each other ; the principal distinction being that in *L. griseus* the nasals are broader behind, and the posterior portion of the palatine opening is much more open than in *L. auritus*. There are also important external differences between the two species ; the hair in *L. griseus* is longer and rather softer ; it is especially longer on the face, and has all the basal portion in that region black, whilst in *L. auritus* the basal portion of the hairs on the head is light-grey. The general colour of the two species, too, is quite different, *L. auritus* being brown, whilst *L. griseus* is grey.

From *L. macrotis* the present species is distinguished by colour, and the skull differs in the same characters as it does from that of *L. auritus* ; the nasal bones being broader behind and the posterior portion of the palatine opening more open. The bony orbits also are rather smaller in *L. griseus*.

The nasal bones of *L. griseus* approach in shape those of *L. roylei*, being nearly as broad behind as in front, but they are longer.

It appears possible that *L. auritus*, *L. griseus*, and *L. macrotis* are all races or sub-species of one typical form just as *L. roylei*, *L. nipalensis*, and *L. tibetanus* appear to be. All these forms are very closely connected.

The other species of *Lagomys* known from Asia are *L. roylei*,<sup>1</sup> from the North-West Himalayas, *L. hodgsoni*,<sup>2</sup> from the same region, considered subsequently by its describer identical with *L. roylei*, *L. nipalensis*,<sup>3</sup> from Nipal, and *L. curzoniae*<sup>4</sup> from the Chumbi valley north-east of Sikkim. By Mr. Waterhouse<sup>5</sup> *L. nipalensis* was considered a distinct species, but Mr. Blyth<sup>6</sup> united it, as well as his own species *L. hodgsoni*, to *L. roylei*. As noticed under *L. ladacensis* Dr. Stoliczka, in 1864,<sup>7</sup> identified the common *Lagomys* of Ladák with *L. curzoniae*, but the species occurring in Sikkim was found to agree better<sup>8</sup> with Mr. Hodgson's description than the Ladák form did, and I consequently suggested that the latter would prove to be an undescribed species, whilst I was disposed to consider the true *L. curzoniae* as a variety of *L. roylei*. Dr. Günther has, however,<sup>9</sup> recently examined the species represented in the British Museum, and he considers *L. curzoniae* a well marked and distinct species, and from his description I am inclined to doubt if the Sikkim form is really *L. curzoniae*.

An additional species has been admirably described and figured from Moupin in Eastern Tibet by A. Milne-Edwards<sup>10</sup> under the name of *L. tibetanus* : this, however, appears very closely allied to *L. roylei* and *L. nipalensis*.

The above are all from the Himalayan ranges and Tibet, but the genus is also well represented in Northern Asia, where the three oldest known species occur. These were described as long ago as 1778 by Pallas<sup>11</sup> as *Lepus pusillus*, *L. alpinus*, and *L. ogotona* ; the first from the Southern Ural, the second from the Altai, and the third from the neighbourhood of Lake Baikal and the deserts of Mongolia. To these a fourth was added by Pallas<sup>12</sup> from

<sup>1</sup> Ogilby in Royle's illustrations of the Botany, &c., of the Himalayan Mountains, p. lxix, pl. 4.

<sup>2</sup> Blyth, J. A. S. B., 1841, x, p. 816, Pl. at p. 844.

<sup>3</sup> Hodgson, J. A. S. B., 1841, x, p. 854, Pl. at p. 816.

<sup>4</sup> Hodgson, J. A. S. B., 1857, xxvi., p. 207.

<sup>5</sup> Mam., ii, p. 24.

<sup>6</sup> Cat. Mam. Mus. As. Soc., p. 133.

<sup>7</sup> J. A. S. B., 1865, xxxiv, pt. 2, p. 108.

<sup>8</sup> J. A. S. B., 1872, xli, p. 35.

<sup>9</sup> Ann. Mag. Nat. Hist., Ser. 4, xvi, p. 230.

<sup>10</sup> Rech. Mammifères, i, p. 314, Pl. XLVIII and XLIX.

<sup>11</sup> Glires, pp. 28-70, Tab. I, II, III and IV.

<sup>12</sup> Zoog. Ros. As., i, p. 152.

North-Eastern Siberia and called *L. hyperboreus*. Of the latter, four varieties are described and figured by Schrenk<sup>1</sup> from the Amur.

From the western portion of Central Asia two species have been obtained : *L. rufescens*, described by Gray<sup>2</sup> from Afghanistan, and since found by myself in Persia ;<sup>3</sup> and *L. rutilus* recently described by Severtzoff<sup>4</sup> from Western Turkestan. The latter is described as greyish-yellow in winter, with a black admixture (?) down the back) beginning from the nape. In summer it is light fiery-red above, with the throat chesnut. Length 8½ inches. Some notes on this species were sent to me by Mr. Dresser who obtained them from Dr. Severtzoff. *L. rutilus* is distinguished from *L. rufescens* by complete absence of white on the muzzle and middle of the neck, and inner parts of all four legs, all these parts being light buff; the flanks, throat, and outside of the legs fulvescent rufous. Upper parts greyish fulvous mixed with some black hairs, ears large, covered with short, harsh, greyish fulvous hair, moustachial bristles (*vibrissæ*) fulvous, a few being black, nails black. The above is the winter dress. *L. rutilus* has been found in the ranges near Vernoe and Auliata, north and north-west of Káshghar.

#### Order—UNGULATA.

##### Sub-order ARTIODACTYLA.

##### Family—*SUIDÆ*.

##### 50. *SUS SCROFA*, VAR. *NIGRIPES*.

W. Blanf., J. A. S. B., 1875, xliv, Pt. 2, p. 112.

1, 2, Thian-Shan mountains near Káshghar.

The two specimens brought, skins with skulls, are of large size, and appear to agree fairly in external characters with the common European wild boar, except that the whole of the fore and hind-feet, with the greater part of the legs, are nearly black. Elsewhere the general colour is dull, rather light-brown, the fur consisting as usual of long bristles and shorter woolly hairs; the former black, except towards the ends, where they are pale yellowish-brown; the latter rather light hair-brown; just around the eye is black; and the ears are clothed with brown hair, darker than that of the head and back.

The skulls are very similar to those of the European wild boar, but present, nevertheless, several marked differences from the only example I have for comparison, that of a male from Hungary. The first difference to be noticed is that, in both the skulls from Turkestan, the occipital plane makes a more obtuse angle with the base of the skull, and a more acute one with the superior surface than in the European skull. In the Turkestan skulls the styliform paroccipital processes are longer, straighter and less divergent; the auditory bullæ larger; the nasal septum less ossified posteriorly, so that the hindermost portion of the nasal

<sup>1</sup> Reis. u. Forsch. im Amur-lande, i, p. 147, pl. VII, VIII.

<sup>2</sup> Ann. Mag. Nat. Hist., 1842, Ser. 1, x, p. 266.

<sup>3</sup> Eastern Persia, ii, p. 83, pl. VI, fig. 2.

<sup>4</sup> Turk. Jev., p. 83, Ann. Mag., Nat. Hist., Ser. 4, xviii, p. 168.

passages is not completely divided. The palatine bones terminate near their suture in small points projecting backwards. The anterior palatine foramina are shorter, broader, and very differently shaped, being much more oval and not acuminate behind. The zygomatic arch is deeper, and the ante-orbital foramen is less open and has a thread-like horizontal process stretched partly or completely across its orifice.

How far these differences entitle the Thian-Shan pig to specific distinction I cannot say without much better means of comparison than I possess at present. If the cranial differences pointed out are never found in European pigs, and if the black legs are equally unknown in typical *Sus scrofa*, the animal of Turkestan may have fair claims to be separated.

The following are comparative measurements of the two skulls from the Thian-Shan mountains, and of the Hungarian skull already referred to—

	Yarkand.		Hungarian.
	♂ Metre.	♀ Metre.	♂ Metre.
Length of the skull from occipital condyle to anterior margin of premaxilla . . . . .	.377	.352	.372
Height of whole skull and lower mandible . . . . .	.250	.226	.239
Length of superior surface from occipital crest to anterior margin of premaxilla . . . . .	.431	.405	.397
Length of superior surface from occipital crest to anterior margin of nasal bones . . . . .	.219	.207	.207
Breadth of skull across zygomatic arches . . . . .	.179	.158	.160
Ditto between orbits . . . . .	.098	.083	.098
Ditto across sinciput where narrowest in front of occipital crest . . . . .	.020	.020	.024
Length of all the upper molar teeth taken together . . . . .	.131	.128	.122
Ditto from hinder edge of bony palate to anterior margin of premaxilla . . . . .	.260	.248	.262
Breadth of palate between anterior premolars . . . . .	.054	.044	.050
Ditto ditto last molars . . . . .	.036	.029	.032
Length of anterior palatine opening . . . . .	.018	.017	.020
Breadth of ditto . . . . .	.008	.0075	.006
Length of lower jaw . . . . .	.315	.291	.305
Height of ditto . . . . .	.140	.136	.136

Whether this form is the common pig of Turkestan or not I have no means of ascertaining; neither Severtzoff nor Prejevalski mention any peculiarities in the colour or structure of the wild swine noticed by them. The only Central Asiatic hog hitherto distinguished from *S. scrofa* is the *S. moupinensis* of A. Milne Edwards<sup>1</sup> from Eastern Tibet, and it is uncertain whether this is not Himalayan (*i. e.*, oriental) and not Tibetan.

#### Family—BOVIDÆ.

##### 51. OVIS KARELINI.

Severtzoff, Turk. Jev., pp. 84, 86, 150, Pls. I, V, fig. 3, VI, figs. 3, 4;—Ann. Mag. Nat. Hist., Ser 4, xviii, pp. 171, 210, 217,—V. and B. Brooke, P. Z. S., 1875, p. 512.

*Ovis poli*, Stoliczka, P. Z. S., 1874, p. 425, Pl. LIII, (*figura mala*), *nec* Blyth.

<sup>1</sup> Rech. Mam., I, p. 377, Pls. LXXX, LXXXI.

*Wild sheep of Thian-Shan*, Biddulph, P. Z. S., 1875, p. 157.

*Ovis heinsi?* W. Blanf., J.A.S.B., 1875, xliv, Pt. 2, p. 112, *nec* Severtzoff.

*Kulja*, Turki of Káshghar.

*Ar* or *Ghuljár*, ♂; *Arka* (?*Arkán*) ♀; *Khirghiz*.<sup>1</sup>

1-7, ♂, 8-11, ♀; skins, 12, skeleton, head wanting; unlabelled, but apparently all from the mountain ranges north-west of Káshghar.

A large collection of specimens of the wild sheep inhabiting the mountains north-west of Káshghar was made by Dr. Stoliczka<sup>2</sup>; but after his death a considerable part of the collection, including all the finest specimens, was distributed with the consent of the Government, the greater portion becoming private property. The distribution was made with so little care and with so wanton a disregard of the interests of Government, to whom the collection belonged, and of Dr. Stoliczka's memory, that even the heads belonging to two skeletons, especially prepared, of *Ovis karelini* and *Capra sibirica*, were given away. There is reason to believe that two skulls of the true *O. poli* of the Pámir were brought away by Dr. Stoliczka, but both were removed from the collection before it reached the Indian Museum.

Of the seven male specimens of *O. karelini* remaining, none possesses a fine pair of horns; but several of the skins are good and well preserved. When making out the list of species collected by Dr. Stoliczka, having only Severtzoff's untranslated work to refer to, I thought, judging by the figures alone, that the species might be that described by that naturalist as *O. heinsi*; but Sir V. Brooke has since shown that the wild sheep, of which so many specimens were brought to Káshghar and presented to the Mission, is *O. karelini* of the same naturalist.

The following is a copy of Dr. Stoliczka's account of this sheep in the Proceedings of the Zoological Society. Dr. Stoliczka, it should be remembered, has naturally identified the animal with *O. poli*, as the difference between the two forms was then unknown—

“ *Male, in winter dress.*—General colour above hoary-brown, distinctly rufescent or fawn on the upper hind neck and above the shoulders, darker on the loins, with a dark line extending along the ridge of the tail to the tip. Head above and at the sides a greyish-brown, darkest on the hind head, where the central hairs are from 4 to 5 inches long; while between the shoulders somewhat elongated hairs indicate a short mane. Middle of upper neck hoary-white, generally tinged with fawn; sides of body and the upper part of the limbs shading from brown to white; the hair becoming more and more tipped with the latter colour. Face, all the lower parts, limbs, tail, and all the hinder parts, extending well above towards the loins, pure white. The hairs on the lower neck are very much lengthened, being from 5 to 6 inches long. Ears hoary-brown externally; almost white internally. Pits in front of the eye distinct, of moderate size and depth, and the hair round them generally somewhat darker brown than the rest of the sides of the head. The nose is slightly arched and the muzzle sloping. The hair is strong, wiry, and very thickly set, and at the base intermixed with scanty, very fine fleece; the average length of the hairs on the back is from 2 to 2½ inches. The iris is brown. The horns are subtriangular, touching each other at the base, curving gradually with a long sweep backwards and outwards; and after completing a full circle, the compressed points again curve backwards and outwards; their surface is more or less closely transversely ridged.

<sup>1</sup> Shaw (visit to High Tartary, Yarkand, and Káshghar, p. 425,) says the name of the male is *Arkár* and of the female *Goolja*; but Dr. Stoliczka, Captain Biddulph, and Captain Trotter reverse the meaning of the terms. *Arkán* or *Arkár* is evidently the same word as *Argali*. Captain Trotter informs me that the correct names are those assigned above.

<sup>2</sup> In a private letter to me written from Kárghalik not many days before his death, Dr. Stoliczka told me he had despatched 22 skins of this sheep from Káshghar; only 11 remain.

" The following are measurements taken from a full-grown male, though not the largest in the Mission collection :—

	Inches.
Total length from between the horns to tip of tail . . . . .	62·
Length of head . . . . .	13·25
Tail (including the hair at tip $1\frac{1}{2}$ inches long) . . . . .	5·5
Distance between snout and base of ear (the eye lies below this connecting line) . . . . .	12·75
Distance between base of ear and the eye . . . . .	3·25
Distance between snout and eye . . . . .	8·5
Distance from the contact of horns to snout . . . . .	12·
Breadth between the anterior angle of eyes . . . . .	6·
Length of ear in front . . . . .	4·75
Height of shoulder (the hair being smoothed, beginning from the edge of the middle of the hoof at the side) . . . . .	44·
Girth round the breast . . . . .	51·5
Length of one horn along the periphery . . . . .	48·
Circumference of one horn at base . . . . .	15·
Distance between the tips . . . . .	38·

" The colour of full-grown females does not differ essentially from that of the males, except that the former have much less white on the middle of the upper neck. The snout is sometimes brown, sometimes almost entirely white, the dark eye-pits becoming then particularly conspicuous. The dark ridge along the tail is also scarcely traceable.

" In size, both sexes of *Ovis poli* appear to be very nearly equal; but the head of the female is less massive, and the horns, as in allied species, are comparatively small: the length of the horns of one of the largest females obtained is 14 inches along the periphery, the distance at the tips being 15 inches, and at the base a little more than 1 inch. The horns themselves are much compressed; the upper anterior ridge is wanting on them; they curve gradually backwards and outwards towards the tip, though they do not nearly complete even a semicircle.

" In young males, the horns at first resemble in direction and slight curvature those of the female, but they are always thicker at the base and distinctly triangular.

" The length of the biggest horn of a male along the periphery of curve was 56 inches, and the greatest circumference of a horn of a male specimen at the base,  $18\frac{1}{2}$  inches.

" Mr. Blyth, the original describer of *Ovis poli* from its horns, was justified in expecting, from their enormous size, a correspondingly large-bodied animal; but in reality such does not appear to exist. Although the distance between the tips of the horns seems to be generally about equal to the length of the body, and although the horns are very much larger, but not thicker than those of the *Ovis ammon* of the Himalayas, or equally massive, the body of the latter seems to be comparatively higher. Still it is possible that the *Ovis poli* of the Pamir may stand higher than the specimens described, which were obtained from the Thian-Shan range.

" Large flocks of *Ovis poli* were observed on the undulating high plateau to the south of the Chadir Kul, where grass vegetation is abundant. At the time the officers of the Mission visited this ground, *i. e.*, in the beginning of January, it was the rutting season. The characters of the ground upon the Pámír and upon the part of the Thian-Shan inhabited by these wild sheep are exactly similar."

I find from the skins preserved, that the dark mark above the tail is not constantly present even in males; in females Dr. Stoliczka notices that it is deficient. Some specimens are far more hoary, especially on the neck and flanks, than others.

All the skins of *Ovis karelini* obtained by Dr. Stoliczka appear to have been shot in winter. The animals from which they were taken were, I believe, brought down frozen to Káshghar.

The figure of this sheep in the P. Z. S. for 1874 is unfortunately far from accurate. The general colour is much too rufous; the crest along the back of the neck is entirely imaginary, and there is no black line along the back in any of the skins sent. The tail is so badly drawn, that the long hair of the left thigh appears to belong to it, and to represent a long bushy tail, the real tail, which is quite short, being indistinct. The white of the lower parts should be purer and should come further up the flanks; the horns are ill drawn. The original sketch was by Colonel Gordon, who informs me that the draughtsman who prepared the plate made several material alterations in the drawing.<sup>1</sup>

Excellent figures of this wild sheep and of its horns are given by Severtzoff (l. c.); a woodcut taken from Severtzoff's plate of the adult male is added to the last edition of Yule's Marco Polo.<sup>2</sup> There are good woodcuts of the horns and skull from a specimen procured by Captain Biddulph in Messrs. V. and B. Brooke's paper.

According to Severtzoff, *O. karelini* inhabits a large area in the Thian-Shan range north of Eastern Turkestan, and extends thence northward into the Semiretchinsk Altai and Saplisky Altai.

Sir V. Brooke observes that a specimen from near Káshghar sent to England by Colonel Gordon shows a very much greater extent of white on the lower sides and haunches than appears to have existed in either of Severtzoff's specimens.

## 52. OVIS POLI.

Blyth, P. Z. S., 1840, p. 62; Ann. Mag. Nat. Hist., Ser. 1, vii, p. 195, Pl. IV, figs. 1, 2, 3, 4.—Gray, Cat. Mam. B. M., Ungulata Furcipedæ, p. 165 (1852); Cat. Rum. Mam. B. M., p. 54 (1872).—Severtzoff, Turk. Jev., pp. 84-102, 149, Pl. II, III, V, figs. 1, 2, VI, fig. 1; Ann. Mag. Nat. Hist., 1876, Ser. 4, xviii, pp. 210, 220.—Biddulph, P. Z. S., 1875, p. 157.—V. and B. Brooke, P. Z. S., 1875, p. 514.—Marco Polo's travels, Yule's edition, 1871, i, p. 163; 2nd edition, 1875, i, pp. 18, 185.—Prejevalski, Pet. Mitt., Erg. hft., No. 53, pp. 5, 17; from Kulja, &c., pp. 45, 84.

*Kutch-kar*, Wood, Journey to Source of Oxus, p. 241 (edition of 1872).

*Kuchkár*, male, *mesh*, female,<sup>3</sup> in Wakhán (Trotter).

As already stated in the notes on *O. karelini*, no specimens of this magnificent sheep remained in the collection made by Dr. Stoliczka when it was received by the Indian Museum, although from the accounts given by the natives who accompanied him, there can be no doubt that he brought away two heads from the Pámir. One of these was presented by Sir Douglas Forsyth to the East Indian Museum at South Kensington.

Fortunately four heads from the Pámir, brought back by different members of the Mission, appear to have been examined by Sir V. Brooke, and the dimensions are given in his paper. These heads were compared with the types originally named by Blyth and fully identified. The species was originally described from specimens obtained by Wood in his journey to the source of the Oxus. The heads from the Pámir are consequently typical.

It is far from certain whether Stoliczka noticed the differences between this sheep and *Ovis karelini*. He had, of course, no opportunity of comparing specimens. Only a single

<sup>1</sup> See P. Z. S., 1875, p. 540; 1876, p. 415.

<sup>2</sup> Edition of 1875, p. 186.

<sup>3</sup> Compare *gúch*, ram, *mish*, ewe; Persian for both wild and tame sheep.

female was killed on the Pámir; but if the skin was preserved, it was not added to the collection. Carriage was scarce at the time, and fewer specimens were taken than would have been the case under more favorable circumstances. Judging both from Stoliczka's diary and from Captain Biddulph's remarks in the Proceedings of the Zoological Society, the distinction between the two kinds of wild sheep was not recognized by any of the members of the Mission when on the Pámir, although all noticed the greater length of the Pámir horns. When Captain Biddulph had an opportunity of comparing heads of the two animals, he noticed the great difference in the curve of the horns as well as in their length.

It is unnecessary to point out the distinction between the two sheep at length: this has been done already by Dr. Severtzoff, and Messrs. V. and B. Brooke, in the papers quoted above. The differences in colouration are shewn by Severtzoff's figures and description to be trifling: *O. poli* has longer hair on the neck. The much greater length and greater divergence of the horns in *O. poli* are the most striking characters. In Dr. Stoliczka's notes there are measurements of one gigantic pair in which the right horn measured  $65\frac{1}{2}$  inches round the curve, the left horn 64, the distance from tip to tip of the horns was 53 inches, and the circumference of each horn at the base 16 inches. The curve varies somewhat, however. Thus, amongst the measurements given by Messrs. Brooke, in one skull, with horns 49 inches long round the curve, the tips are  $49\frac{1}{2}$  inches apart; in another, the original type described by Blyth, each horn measures 56 inches, but the distance between the tips is only 45, and similarly amongst the specimens brought by members of the Yárdzand Mission, in the skull presented to the East Indian Museum by Sir D. Forsyth, the relative measurements are given as 55 and  $43\frac{1}{2}$ , whilst in a specimen obtained by Captain Biddulph and measured by myself they are 51 and 49.

It may be as well to point out here, that the *O. poli* of Severtzoff is found considerably north and north-east of the Pámir in parts of the Thian-Shan range, north and north-east of Káshghar; that it is uncertain whether the animal inhabits the intervening tract, and that, so far as is known, no specimens from the two areas have been compared: only the skull and horns of the Pámir animal are known. It is most probable that the Thian-Shan race is identical with that found on the Pámir, but further comparison is desirable.

According to Severtzoff, *O. poli* ranges to the east of Lake Issyk, in the high plateaus around Han Tengri (Tengrikhan). It is not found further north, but Prejevalski met with it further east on the Juldus river. It is also included by Prejevalski in his list of animals occurring on the Altyn Tágh, south of Lob-nor<sup>1</sup>. Here again further comparison is desirable, as there is a possibility that some other race has been confounded with *O. poli*. Nothing was previously known of any wild sheep from the Kuenlun ranges, except the very distinct *O. nahura*, and Messrs. V. and B. Brooke have suggested<sup>2</sup> that the Argali of the Kuenlun mountains may be *O. brookei*.<sup>3</sup> If *O. poli* really inhabits the ranges north of Tibet and south of the Turkestan plain, the views expressed by Messrs. Brooke as to the distribution<sup>4</sup> of the Central Asiatic sheep of the Argali type will need modification. These naturalists suggest that the glacier system of the Kárakoram, or, in other words, the Mustágh range, forms a barrier between the areas inhabited by *O. poli* and *O. hodgsoni*.<sup>5</sup>

<sup>1</sup> Ante, p. 7.

<sup>2</sup> P. Z. S., 1875, p. 521.

<sup>3</sup> P. Z. S., 1874, p. 143.

<sup>4</sup> Tom. cit., p. 526.

<sup>5</sup> In the "Narrative of progress of Mission to Káshghar and back to India" published in the "Official Report," p. 69, *O. ammon* (i. e., *O. hodgsoni*) is said to be found on the Tílet border of Kashgharia about Tághdumbásh and Múztagh. Tághdumbásh is north of the Mústágh range.

The two other species of sheep described by Severtzoff from Western Turkestan, *O. heinsi* from near Tokmak, north of Lake Issyk, and *O. nigrimontana* from the Karatau or black mountains, north-east of the Syr or Jaxartes, are smaller forms, but apparently more nearly allied to *O. poli* and *O. karelini* than to any other species of wild sheep. It may not improbably be found that intermediate varieties occur, and that all these forms of wild sheep are merely races more or less completely differentiated. It should also be noticed that not only are these closely allied species distinguished on very small data, but that Dr. Severtzoff's ideas of specific distinction induce him to class apart forms which other naturalists do not separate.

The other known Central Asiatic wild sheep of the true Argali type, omitting doubtful forms, are *O. ammon*<sup>1</sup> (*vera*=*O. argali*,<sup>2</sup> Pall.) formerly inhabiting the Altai mountains and Dauria, but now supposed to be almost confined to part of Northern Mongolia, *O. jubata*<sup>3</sup> from north of Pekin, *O. hodgsoni*<sup>4</sup> (the *O. ammon* of Anglo-Indians generally) from the Tibetan plateau, and *O. brookei*,<sup>5</sup> of uncertain derivation, besides *O. nivicola*<sup>6</sup> from Kamtschatka, nearly allied to the American *O. montana*. *O. vignei*, *O. gmelini*, *O. cycloceros* and their allies form another group of species found in South-Western Asia and the Mediterranean area.

### 53. OVIS NAHURA, Pl. XIV.

*O. nayaour*, Hodgs., As. Res., xviii, Pt. 2, p. 135, partim.

*O. nahoor*, Hodgs., J. A. S. B., 1835, iv, p. 492.

*O. burrhel*, Blyth, P. Z. S., 1840, p. 67.—Ann. Mag. Nat. Hist., Ser. 1, vii, p. 248.—J. A. S. B., 1841, x, p. 868.

*Ovis nahura*, Hodgs., apud Gray, List. Spec. Mam. B. M. (1843), p. 170.

*Pseudois nahoor*, Hodgs., J. A. S. B., 1846, xv, p. 343.—Gray, Cat. Mam. B. M., Ung. Fur., p. 177 (1852).—Adams, P. Z. S., 1858, p. 527.—Prejevalski, Pet. Mitt., Erg. Hft., No. 53, pp. 5, 17.

*Ovis nahura*, Blyth, Cat. Mam. Mus. As. Soc., p. 178.—Jerdon, Mam. Ind., p. 296.

*O. nahoor*, A. Milne-Edwards, Rech. Mam., I, p. 357, Pl. LXVIII, LXIX.

1 ♂, near Tam, Sánju valley, Kuenlun range.

As pointed out by Jerdon, Blyth appears to have ultimately considered his *Ovis burrhel* identical with *O. nahura*, although at first he looked upon it as distinct on account of the darker colour and more rounded horns, but these differences are apparently due to age and season.

The name has been spelt in various ways—*nayaour*, *nahoor*, *nahur*, and *nahura*. I have adhered to the last, because it has been adopted by Jerdon and Blyth, and because *nayaour*, the oldest name, was corrected by Hodgson himself. I may add that the name appears to have been given altogether in error, for Hodgson in his original paper in the Asiatic Transactions, Vol. XVIII, Pt. 2, pp. 133, 134, states that the native name for the *Ovis ammon* is *bharal*, and for the smaller Himalayan sheep *nayaour*. In truth, the reverse is the case, as is well known, and Hodgson must have confounded the two. Perhaps it would be more convenient to drop

<sup>1</sup> Linn., Syst. Nat., 1766, Ed. xii, p. 97.

<sup>2</sup> Spic. Zool., fasc. xi, p. 21.

<sup>3</sup> Peters., Monatsber. K. Akad. Wiss. Berlin, 1876, p. 177, Pls. 1—4.

<sup>4</sup> Blyth, P. Z. S., 1840, p. 65.

<sup>5</sup> Ward, P. Z. S., 1874, p. 143.

<sup>6</sup> Esch., Zool. Atlas, p. 71, (1829.)

Hodgson's name altogether and adopt Blyth's *O. burrhel* for this wild sheep, but the spelling is very erroneous, and, on the whole, it appears as well to keep the name *nahura*.

In his original description, Hodgson figured and described the skull of a young *Ovis hodgsoni*, which he supposed to be that of the male of his *O. nayaur*, but the type of the latter species was a female which he had alive.

The only skin obtained from the Kuenlun by Dr. Stoliczka, that of a fine ram, represented on Plate XIV, closely resembles the animal found in Sikkim. It also agrees precisely with specimens from the North-West Himalayas.

The locality at which the Kuenlun *O. nahura* was obtained is beyond the previously known range of the animal. It has not hitherto been found further west; but Prejevalski obtained it on the Altyn-tagh, south of Lob Nor. According to Jerdon it is unknown in the Himalaya west of the Sutlej, and is replaced in Ladák and the neighbouring regions by *O. vignei*. This, however, is not quite correct. Adams has mentioned<sup>1</sup> that *O. nahura* is found in the Nubra valley in Northern Ladák, and I learn from Dr. Cayley that it is met with in most parts of Ladák, though it becomes rare to the westward, and that so far from being replaced by *O. vignei*, the two species are sometimes found occupying the same valleys.

The bharal has a considerable range to the eastward; it is common in Northern Sikkim, and it has recently been obtained by Père David in Moupin, and a specimen from that locality has been figured by A. Milne-Edwards, l. c. The plate represents a young male, but although the general colouration corresponds with that of the western Tibetan species, the curve of the horns appears somewhat different, for they rise more above the head in the Moupin animal.

#### 54. CAPRA SIBIRICA.

Meyer, Zool. Annal., I. 397, (1794)—Ehrenberg., Symb. Phys., dec. II, fol. mm.—Wagner, Schreber Säugth. v, pp. 1256, 1297 (1836)—Supp. Pt. iv, p. 490.—Gray, List Spec. Mam. B. M. (1843), p. 167.—Cat. Ung. Fur. (1852), p. 150.—Cat. Rum. Mam. (1872), p. 52.—Blyth, Cat. Mam. As. Soc. Mus., p. 176.—Jerdon, Mam. Ind., p. 292.—Severtzoff, Turk. Jev., p. 102; Ann. Mag. Nat. Hist., Ser. 4, xviii, p. 333.

*Ibex alpium sibiricarum*, Pallas, Spic. Zool., xi, p. 31 (1776).

*Aigoceros ibex*, Pall., Zoogr. Ros. As., i, p. 224.

*Capra sakeen*, Blyth, J. A. S. B., xi, 1842, p. 283.

*Ægoceros skyn*, Wagner, Schreb. Säugth. Supp. iv, p. 491 (1844).

*Capra himalayana*, Gray, Cat. Ung. Fur. B. M. (1852), p. 150.—Adams, P. Z. S., 1858, p. 523.

*Capra skyn*, Severtzoff, Turk. Jev., p. 102.—Ann. Mag. Nat. Hist., Ser. 4, xviii, p. 334.—Prejevalski, Pet. Mith., Erg. Hft., No. 53, p. 5. From Kulja, &c., p. 45.

*Tekke*, ♂ *Kalják*, ♀ *Káshghar*.

*Rang* ♂, *buz* ♀, *Wakhán*.<sup>2</sup>

1-3, ♂, heads, 4, 5, skins of young ♂, with horns, but without skulls; 6-8, ♀, skins with skulls; 9, skeleton, head wanting; (all without labels, except one female from Tám, Sánjú valley; the others are probably from the Thian-Shan range near Káshghar).

Of this animal, as in the case of *Ovis karelini*, all the best specimens appear to have disappeared from the collection, and there is not a single skin of an adult male. This is greatly

<sup>1</sup> P. Z. S., 1858, p. 527.

<sup>2</sup> I am indebted to Captain Trotter and Captain Biddulph for these names. The Káshghar name is from Dr. Stoliczka's diary.

to be regretted, for although horns abound in collections, perfect skins are excessively rare, and there are none in Calcutta. I regret that for want of sufficiently good specimens I am unable to give a figure of this species.

It should be mentioned that Dr. Severtzoff and Colonel Prejevalski distinguish the true *Capra sibirica* of Siberia and North-Eastern Turkestan from *C. skyn* of the Himalayas, but the former states that his opportunities of comparison are insufficient to decide the question, and he appears chiefly to base his belief in the distinction of the two forms on the differences presented by the wild sheep of the same regions. Colonel Prejevalski refers the animal he met with on the Juldus ranges of the Thian-Shan east-south-east of Kulja to *C. skyn*, because the horns curve towards each other at their extremities, but *C. sibirica* may vary in this character as *C. aegagrus* does.

I have compared the female skins with Pallas' original description of the Siberian ibex, and am inclined to believe that they agree, but that the general colour of the Káshghar ibex is rather darker. The solitary (female) specimen from near Sánjú, south of Yárkand, has the anterior portions of the legs brown instead of black, but this appears due to immaturity.

The skin of an old female is dull greyish-brown above, the woolly under-fur being ash-grey, the longer hairs brown, with pale tips; there is a rudimentary dark streak down the hinder portion of the back. The ears are the same colour as the back, the edges dark-brown, the inner portion whitish. Head rather paler, owing to the pale tips of the hair being longer. There is a dark line round both lips, interrupted by a whitish spot at the front of the lower lip; the dark space is broader on the lower lip than on the upper, and on the latter there is a narrow pale line between the dark line and the lip. The breast is quite as dark as the back; lower parts, hinder portions of limbs, inner side of thighs and a narrow area below the tail, including the sides of the tail near the base, whitish, tail blackish-brown, front of all limbs down to the hoofs dark brown, almost black in parts, the black extending in a line up the front of the shoulder and thigh and being gradually lost. There is black hair all round the feet close to both the true and supplementary hoofs.

In younger animals the colour is paler, and the black marks in front of the legs are less distinct, especially near the hoofs.

In the only adult male head which retains the skin (the horns are 35 inches long round the curve), the beard is greyish-brown like the rest of the hair, not black; the hairs being eight inches long. The colour of this head is similar to that of the female.

Hayward<sup>1</sup> states that the ibex of the Kuenlun near Sánjú differs from that of Kashmir and resembles the "black ibex" of Baltistan. The horns, he adds, appear thinner and the knots are not so well defined as in the animals found in Kashmir and Ladák.

*Capra sibirica* is known to extend throughout a large area in Central Asia. It is common on the Pámir and in Wakhán,<sup>2</sup> and is probably found throughout the Hindu Kush, which, with the Thian-Shan ranges, must be its most western habitat. It extends throughout the inner portion of the Western Himalayas and the mountainous parts of Tibet, but it has not yet been obtained from the Eastern Himalayas, though I have heard of its occurrence in Tibet, north of Sikkim. To the northward it is found in the Altai and Sayansk mountains on the frontier of Siberia, south-west of Lake Baikal.

<sup>1</sup> Jour. Roy. Geog. Soc., 1870, XL, p. 69.

<sup>2</sup> Captain Biddulph tells me that he learned in Wakhán that some years since ibex existed there in great numbers, but that many died of a murrain which broke out, and the numbers are now less.

## 55. GAZELLA SUBGUTTUROSA, var. YARKANDENSIS. Pl. XV.

*Antilope subgutturosa*, Guld., Act. Acad. Petrop., i, p. 251,

*Gazella subgutturosa*, Brooke, P. Z. S., 1873, p. 545.

*Kik*<sup>1</sup> or *Saikik* and *Jairán*, Túrki of Yárkand and Káshghar.

1, 2, 3, 4, ♂, 5 ♀, 6 young ♀, Yárkand or Káshghar. No labels.

It is perhaps a question whether the Eastern Turkestan form of gazelle should not be raised to the rank of a species. It differs principally from the typical *G. subgutturosa* in the very much darker markings on the face and in the much smaller degree to which the horns diverge. The horns are very similar to those of a skull from Kándahár,<sup>2</sup> but much less openly lyrate than in a head from Isfahán, or in the type figured by Güldenstadt. The size appears rather larger than that of the Persian gazelle. But as there is some variation in face-markings amongst Persian specimens, it is perhaps better to consider the Yárkand race as only a variety.

The following is a description of the skins brought, all of which appear to have been killed in winter.

Horns approximate at the base, regularly but slowly diverging, and curving very slightly backwards till near the tips, where they are turned suddenly towards each other and forwards. There are rings on the horns nearly to the tips. The largest number of rings on any of the horns brought is 14. These horns are each  $12\frac{1}{2}$  inches long measured round the curve.<sup>3</sup> No horns in the female. Hair long and rather coarse. The longest hairs on the back measure about 2 inches. The general colour above is rather light rufous-brown (fawn colour). The hairs are brown at the tips, pale lilac-grey below. There is no admixture of wavy woolly fibres with the hairs.

The pale lateral line<sup>4</sup> is distinct, but does not differ much in colour from the back, being only a little paler; the dark lateral band beneath it and the dark pygal bands are faint; abdomen and posterior inner portion of thighs white.

Long hairs round the base of the horns, and the central facial band of blackish-brown, light-brown and white mixed, there being a larger number of very dark hairs in front of the horns, and a more or less distinct blackish line from the anterior base of the horn, down each side of the central facial band, to a blackish spot about two-thirds of the distance from the base of the horns to the muzzle. Light facial streaks very distinct, dirty white; dark facial streaks well marked, mixed blackish-brown and light-brown, blackest just in front of the eye around the orifice of the antorbital gland. Ears light-brown outside, tail blackish-brown; knee brushes variable, dark-brown more or less mixed with light-brown. There are some black hairs round the base of the hoofs and along the hinder portion of the feet between the true and supplementary hoofs.

<sup>1</sup> I learn from Captain Biddulph that Kik means "deer" in a very loose sense, being applied also to wild sheep. Saikik means desert deer, whilst Jairán is the correct name for gazelle. On the other hand, Captain Trotter tells me that Kik is used for the male, Jairán for the female.

<sup>2</sup> Figured in Geol. Zool. Abyssinia, Pl. 1, p. 4. This figure might almost have been taken from a pair of Yárkand horns.

<sup>3</sup> Since this was written, I have seen a much finer pair of horns belonging to Captain Biddulph and brought by him from Turkestan. They measure each 14 inches in length round the curve, the tips are  $5\frac{1}{2}$  inches apart, and the circumference of each at the base 5 inches. They diverge nearer to the head than the other specimens do, and hence their curve agrees better with that of typical *G. subgutturosa*.

<sup>4</sup> For definition of the terms "lateral lines," "facial band," &c., see Sir V. Brooke, P. Z. S., 1873, p. 536.

The length of the skull in an old male is 8·5 inches, in an adult female 7·5. Ears between 5 and 6 inches long; vertebrae of the tail 5 inches; hairs at end 2.

This gazelle is doubtless that mentioned in Dr. Stoliczka's posthumous note "on the Avifauna of Káshghar in winter,"<sup>1</sup> under the name of *Antilope gutturosa*, and said to be found abundantly about Marálbáshi. It is also, I have very little doubt, the animal to which Shaw refers<sup>2</sup> as having been brought to him at Yárkand, and of which he says that the Yárkandi name is "Saikeek."

If I am correct in uniting the Yárkand gazelle to *Gazella subgutturosa*, the range of that species is very great. It is found throughout the highlands of Persia, though not in the neighbourhood of the Persian Gulf. It extends along the western coast of the Caspian to near Bákú and is found about Tabriz. It occurs at Kándahár, Bokhára, and throughout Western Turkestan,<sup>3</sup> and, it now appears, east of the Pámír, so that it may be found close to the range of *G. gutturosa*.

#### 56. PANTHOLOPS HODGSONII. Pl. XVI.

*Antilope hodgsonii*, Abel, Edin. Jour. Sc., 1827, p. 163.

*A. (Oryx) kemas*, Ham. Smith, Griffith's Cuv. An. King., v, p. 328 (1827).

*Antilope chiru*, Less., Man. Mam., p. 371 (1827).

*Antilope hodgsonii*, Hodgs., Gleanings in Science, i, p. 144 (1829).—Ib. ii, p. 348, Pls. III, V, (1830).—

P. Z. S., 1830, p. 52, &c.—J.A.S.B., i, p. 59, Pl. IV (1832).—Ib. iii, p. 134.—Hooker's Himalayan Journals, ii, pp. 132, 157, and woodcut, p. 158 (1854).

*Pantholops hodgsonii*, Hodgs., P.Z.S., 1834, p. 81.—J.A.S.B., xii, 1843, Plate issued with No. 135.—

Wagner, Schreb. Säugth., Supp. iv, p. 420 (1844)—Ib. v, p. 402 (1856).—Gray, Cat. Mam. B. M. Ungulata Furcip., p. 53 (1852)—Cat. Rum. Mam. B. M., p. 33 (1872).—Adams, P.Z.S., 1858, p. 521.

*Kemas hodgsonii*, Gray, List Spec. Mam. B.M., p. 157 (1843).—Ann. Mag. Nat. Hist., 1846, xviii, p. 231.—Blyth, Cat. Mam. As. Soc., p. 173 (1863).—Jerdon, Mam. Ind., p. 282 (1867).—W. Blanf., J.A.S.B., 1872, p. 39.

1 ♂, Kium, Ladák; 2 ♀, no label.

The Chirú appears to have been described in the same year by Abel, Hamilton Smith, and Lesson. I have only access to the two last-mentioned. This species was subsequently well and thoroughly described by Hodgson from the living animal, and the same naturalist in 1834 proposed a new genus *Pantholops* from "the vulgar old name for the unicorn."

In 1843 Gray called this antelope *Kemas hodgsonii*, and the generic name was adopted by Blyth in the Catalogue of Mammals in the museum of the Asiatic Society, and has been generally used in India, although Gray in later catalogues corrected his former mistake.

The genus *Kemas* was originally proposed by Ogilby in 1836, the type being<sup>4</sup> the Goral (*Antilope goral*, Hardwicke). The generic name has been wrongly applied to the Chirú by Gray and Blyth, and again misapplied by Gray to the wild goat of the Nilgiris (*Hemitragus hylocrius*, Ogilby sp.), neither of which is congeneric with the Goral. Ogilby certainly

<sup>1</sup> Stray Feathers, 1874, ii, p. 216.

<sup>2</sup> High Tartary, Yarkand, and Káshghar, p. 221.

<sup>3</sup> See P. Z. S., 1873, pp. 313, 546. Severtzoff, Turk. Jev., p. 62.

<sup>4</sup> P. Z. S., 1836, p. 138.

included the Nilgiri goat in his genus *Kemas*,<sup>1</sup> but this was in a subsequent paper to that in which he gave the characters of the genus and named the Goral as the type.

Hodgson's antelope has been variously classed by different authors, but there can be but little doubt that Hodgson was right in considering it closely allied to the Gazelles. The form of the feet with their very pointed hoofs strongly supports this view.

The following detailed measurements of a female are from Stoliczka's notes:—

	Inches.
Length from nose to between ears . . . . .	10
, from between ears to top of shoulder . . . . .	14
, " top of shoulder to base of tail . . . . .	26
, " of tail without tuft . . . . .	4.5
, " with tuft . . . . .	7
Total length from nose to tip of tail . . . . .	53
Length of ear from front base . . . . .	5.8
, " orifice to tip . . . . .	4.3
, " hind base . . . . .	4.8
Median breadth of ear . . . . .	2.5
Girth round the breast . . . . .	35
Height at shoulder . . . . .	27.5 (237.5)
Length of fore-leg . . . . .	18
, " from knee . . . . .	10.4
, " hind-leg " . . . . .	24
, " from hock to toe . . . . .	11.5
Height at the hind-feet . . . . .	31
From nose to eye . . . . .	5.8
, eye to base of ear . . . . .	2.5
Height of nose with lower lip . . . . .	3.2

*Pantholops hodgsoni* appears to be common throughout Tibet from the neighbourhood of Lhassa to Ladák. It is found in the Kuenlun range, but has not been met with further to the north-west or west. It was not found by Père David in Eastern Tibet or in Mongolia.

In Mr. Shaw's work,<sup>2</sup> the head of this antelope is figured by mistake as that of the "Keek;" *Gazella subgutturosa*, var. The mistake was made by the publisher of the book in Mr. Shaw's absence.<sup>3</sup>

#### Family—*CERVIDÆ*.

##### 57. *CERVUS EUSTEPHANUS*.

W. Blaaf., P. Z. S., 1875, p. 637.

? *Cervus maral* (*C. canadensis* var.), Severtzoff, Turk. Jev., pp. 62, 103.—Ann. Mag. Nat. Hist., Ser. 4, xviii, p. 377.—Prejevalski, Pet. Mitt., Erg. Hft., No. 53, p. 5.—From Kulja, &c., p. 46.

? *C. maral*, var. *asiatica*, *b. songarica*, Severt., Turk. Jev., p. 109; Ann. Mag. Nat. Hist., t. c., p. 386.

*Cervus cornibus magnis sublævigatis, valde curvatis, superne subplanulatis, subpalmatisque, apices versus convergentibus atque retro productis, ramos ad septem gerentibus, duobus*

<sup>1</sup> P. Z. S., 1837, p. 81.

<sup>2</sup> High Tartary, &c., pp. 168, 169.

<sup>3</sup> I am indebted to Captain Trotter and Captain Biddulph for this information.

*primis subæqualibus approximatis, tertio paullo minore, quarto maximo, basin versus planulato, tribus ultimis gradatim diminuentibus.*

1 pair of loose horns without label said to have been purchased in Kashghar.

The loose horns appear to me to indicate a new stag. They have apparently been shed, and they probably belonged to different animals. They are of large size, each measuring 51 inches in length round the curve, one is 10·9, the other 10·5 inches in circumference at the base, just above the burr. Each shows 7 well-formed tines, so that the animal must have had 14 points. The beam is very much curved, and, so far as it is possible to judge from the form of the burr, the horns must bend somewhat towards each other at the tips and branch apart less than in most stags. The brow antler and bez are close together, the former slightly exceeds the latter in length, and the bez is rather longer than the royal. The greatest peculiarity of the horns, however, is in the form of the crown. Above the royal the beam curves inwards and gives out an anterior tine which is much the largest of all, and slightly compressed, being only a little shorter, and scarcely smaller, than the beam itself. Above this the beam gives out two other tines, each successively diminishing in length, and all these four branches, that is, the beam itself and the three upper tines, are in nearly the same plane, so that by looking at the horn with either the beam or the great fourth tine in front, the remainder of the crown can be concealed behind either one or the other.

The nearest approach to these horns in form with which I am acquainted may perhaps be found in a pair figured by Severtzoff in his Turkestanskie Jevotnie, p. 105, under the name of *Cervus maral*. The number of tines is similar, and there is some resemblance in their form and in the manner in which the beam curves backwards above the royal. The horns figured come from the Thian-Shan. But in Severtzoff's figure, the brow and bez-antlers are much farther apart, the beam appears less curved inwards above the royal, and the tendency to palmation in the crown is wanting, whilst the lowest of the four points composing the crown scarcely exceeds the two next in size.

The horns of *C. eustephanus* differ widely from those of *Cervus maral* represented in the Transactions of the Zoological Society, Vol. VII, p. 336, Pl. XXIX. The curve of the beam in the present stag is greater, the brow and bez-antler closer together, and different in proportion and direction, and the crown is very dissimilar.

On comparing the Thian-Shan horns with those of *Cervus cashmirianus*<sup>1</sup> and *C. affinis*,<sup>2</sup> even greater differences will be noticed. The Turkestan horns are smoother, and curved backwards towards the tip; the brow and bez-antler are closer together, and the form of the crown is totally distinct. Indeed in *C. affinis* there are said never to be more than two points at the tip of each horn above the royal. At the same time the horns of *C. eustephanus* closely approach those of *C. affinis* in the great curve of the beam.

Whatever Mr. Hodgson's *Cervus narayanus*, founded upon a single immature horn (figured J. A. S. B., 1851, xx, Pl. VIII, and described, p. 392) may be, it is evidently something very different, its great peculiarity being the great distance apart of the basal tines.

It appears to me that as regards the horns, the Thian-Shan stag approaches the Wapiti more than any Asiatic deer. The resemblance between the Asiatic stags and *Cervus canadensis* has been discussed by many naturalists, and by none more fully than by Mr. Blyth,<sup>3</sup> who has

<sup>1</sup> Falconer, Pal. Man., i, p. 576.

<sup>2</sup> Hodgson, J. A. S. B., 1841, x, p. 721.

<sup>3</sup> J. A. S. B., 1853, xxii, p. 592; 1861, xxx, p. 185, &c.

pointed out that the most important characters in which the horns of the American stag differ from those of the animals found in Eastern Tibet, Kashmir, and Persia are the smoothness of the former, their tendency to flattening or palmation in the crown, their greater subdivision in the coronal region, and the marked backward curvature and want of convergence in the upper portion of the beam. Now in all these characters the horns brought from Turkestan appear to be intermediate between those of the other Asiatic stags and those of the Wapiti. The horns of the Turkestan stag differ from those of the Wapiti in being less smooth, more curved inwards towards the ends, and in having the brow and bez-antler much nearer together, but they are much nearer to the Wapiti horns than they are to those of *C. cashmirianus* or *C. affinis*.

There can, I think, be very little doubt that *Cervus eustephanus* is the animal described by Severtzoff and Prejevalski as inhabiting the forests of the Thian-Shan and neighbouring ranges. It is a very large animal, as indeed is evident from the dimensions of the horns, adults being, according to Severtzoff, as much as 6 feet high at the shoulder. It is probably known as *maral* by the Arian tribes of Central Asia, the word being Persian for deer. The true *C. maral*, however, inhabiting the forests on the southern coasts of the Caspian and in the Caucasus, &c., is a much smaller animal with, as already noticed, differently shaped horns.

I have no definite information as to the history of the pair of horns described, except that Captain Trotter informs me they were purchased in Káshghar bazar, and were said to have been brought from the forests of the Thian-Shan mountains east of Kulja. Another and larger pair were also brought by the mission, but they were presented to Lord Northbrook and sent by him to England, so I have had no opportunity of examining them. I am informed, however, by Mr. Wood-Mason that they differed considerably from the pair examined by me, and that the terminal portion was greatly flattened.

Since this account of *C. eustephanus* has been written, I have learned that these horns from the Thian-Shan have been examined by Sir V. Brooke and pronounced, if I understand correctly, to belong to some species already described, probably *C. canadensis*. The details, however, have not reached me.<sup>1</sup>

#### 58. CERVUS sp.

*Cervus maral*, Prejevalski, Pet. Mitt. Erg. Hft., No. 53, p. 9.—From Kulja, &c., p. 166.

No specimen of the large deer found in the woods and thickets of Eastern Turkestan was, so far as I know, brought back by the Yárcand Mission. The animal is mentioned in the “General description of Káshghar”<sup>2</sup> near the commencement of the published “Report,” thus, under the head of “Animals.”

“The stag or *búghú* male, and *marál* female, haunts the forest borders along the river courses on the mid plain, and is hunted for its antlers, which are an article of commerce with China.”

The same animal is mentioned, and by the same names, by Captain Biddulph, in the narrative of his visit to Marálbáshi,<sup>3</sup> and is said to inhabit a belt of thick high grass on the banks of rivers.

Almost all the information I have on this deer is derived from Mr. Shaw. All whom I have asked agree that it is a different animal from the great stag of the Thian-Shan. Mr.

<sup>1</sup> Just as the last proof was being passed, I received Sir V. Brooke's paper, P. Z. S., 1878, p. 883, and find, p. 912, that he considers the horns undistinguishable from some of *C. canadensis*.

<sup>2</sup> By Dr. Bellew. Report of a mission to Yárcand in 1873, p. 69.

<sup>3</sup> Report, p. 218.

Shaw procured a head which, however, he did not bring to Calcutta, but of which he has given me a photograph. This is not large enough to show all the characters in detail, but it represents a pair of horns with 10 tines, five on each horn; the two terminal tines subequal, brow and bez close together, and in these characters, as well as in size and form, the horns much resemble those of *C. affinis*.

## 59. CAPREOLUS PYGARGUS.

*Cervus pygargus*, Pallas.

1, a pair of horns attached to the skin, without label, but probably from Káshghar.

A pair of small horns, without any skull, covered with very thick "velvet" and attached to each other by the skin of the forehead, agree fairly with the figure of those of *C. pygargus*.

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PLATE	VIII.	Fig. 1, <i>Arvicola stoliczkanus</i> , p. 42. " 2, <i>A. blythi</i> , p. 39.

PLATE VIIIa. *Nesokia scullyi*, p. 49.

PLATE IX. Fig. 1, *Cricetus fulvus*, p. 45.  
" 2, *Mus pachycercus*, p. 53.

PLATE X. *Gerbillus cryptorhinus*, p. 56.

PLATE Xa. Figs. 1, 1a, 1b, skull of *Nesokia barclayana*, p. 46, 3 views; 1c, 1d, lower jaw, all natural size; 1e, right upper molars, 1f, right lower molars, both enlarged 2 diameters.  
" 2, 2a, 2b, skull of *N. scullyi*, 3 views, 2c, lower jaw, all natural size; 2d, right upper molars, 2e, right lower molars, both enlarged 2 diameters.

PLATE Xb. " 1, 1a, 1b, skull of *Arvicola blythi*, 3 views, natural size; 1c, right upper molars, 1d, right lower molars, both enlarged 4 diameters.  
Fig. 2, right upper molars of *Arvicola stoliczkanus*, enlarged 4 diameters; 2a, lower molars similarly enlarged.  
Figs. 3, 3a, 3b, skull of *Cricetus fulvus*, 3 views, natural size; 3c, incisors, from the front, natural size; 3d, upper molars, 3e, lower molars, both enlarged 4 diameters.  
Fig. 4, skull of *Mus pachycercus* from above, natural size; 4a, 4b, two views of the same enlarged two diameters.  
Figs. 5, 5a, 5b, skull of *Gerbillus cryptorhinus*, 3 views, natural size; 5c, upper molars, 5d, lower molars, both enlarged 2 diameters.

PLATE XI. *Arctomys aureus*, p. 33.

PLATE XIIa. Skull of *Arctomys aureus*, 3 views, natural size.

PLATE XII. *Arctomys himalayanus*, p. 36.

PLATE XIIa. Skull of *Arctomys himalayanus*, 3 views, natural size.

PLATE XIII. *Arctomys caudatus*, p. 37.

PLATE XIIIa. Skull of *Arctomys caudatus*, 3 views, natural size.

PLATE XIV. *Ovis nahura*, p. 85.

PLATE XV. *Gazella subgutturosa*, var. *yarkandensis*, p. 88.

PLATE XVI. *Pantholops hodgsoni*, p. 89.



PLATE XXXVII  
THE HEDGEHOG  
AND THE BEETLE





J. Schaumburg Lith.



1 d



S. Seagfield, imp.

1 ERINACEUS ALBULUS.  
2 CROCIDURA MYOIDES.  
3 MUSTELA STOLICZKANA.



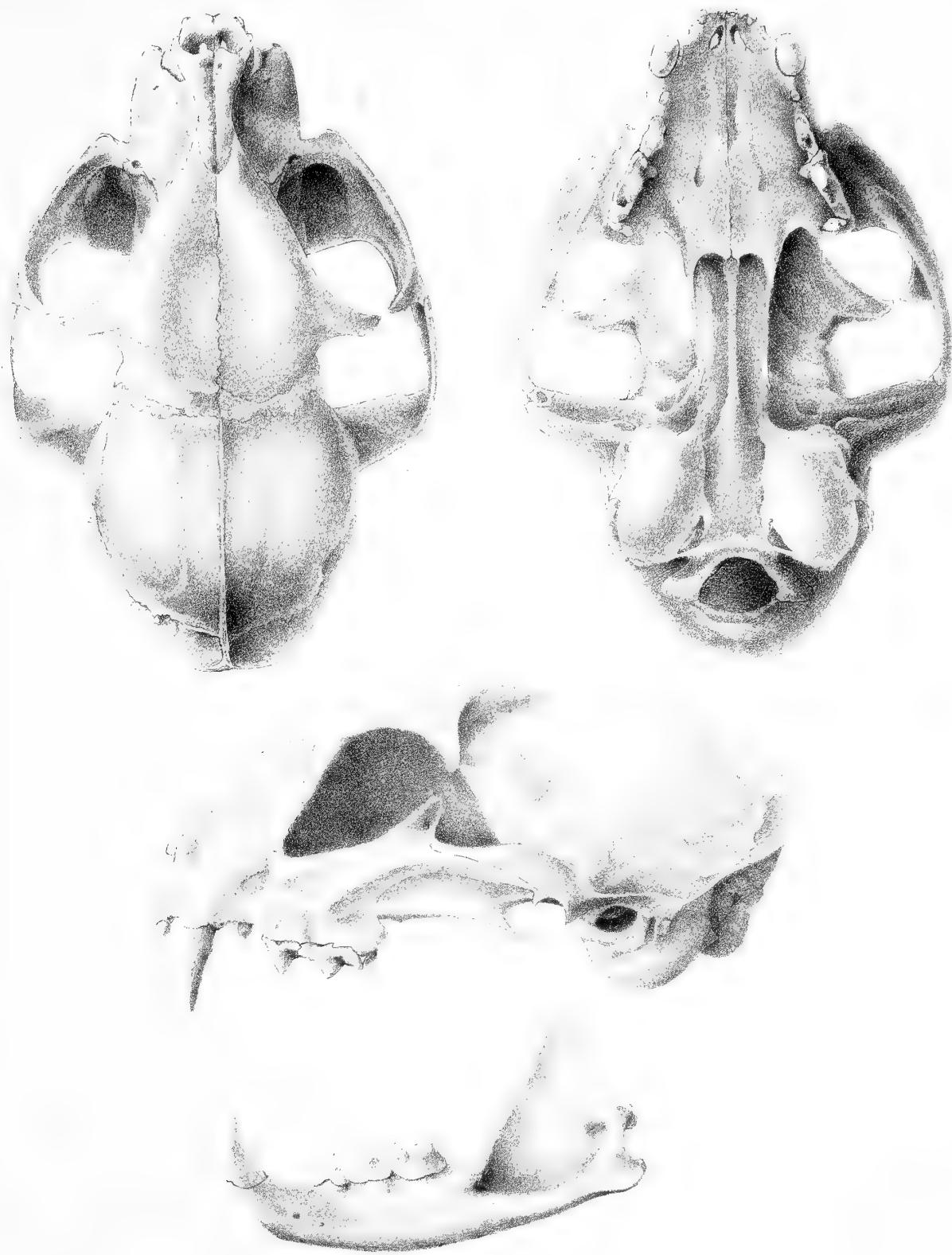


J. Smith lith.

F. E. L. I. SHAWIANA

1830





Kahlúdin Anied del

MacLure & Macdonald, Lith

FELIS SHAWIANA.





J. G. Keulemans

1. *CAUTUS (VULPES) MONTICULUS*  
2. *FLAVESCENS*









J. Smit del.

1, LEPUS HYPSSIBUS, 2, LEPUS PALLIPES, var.

Münster Brüs imp.





J. Smit del et lith

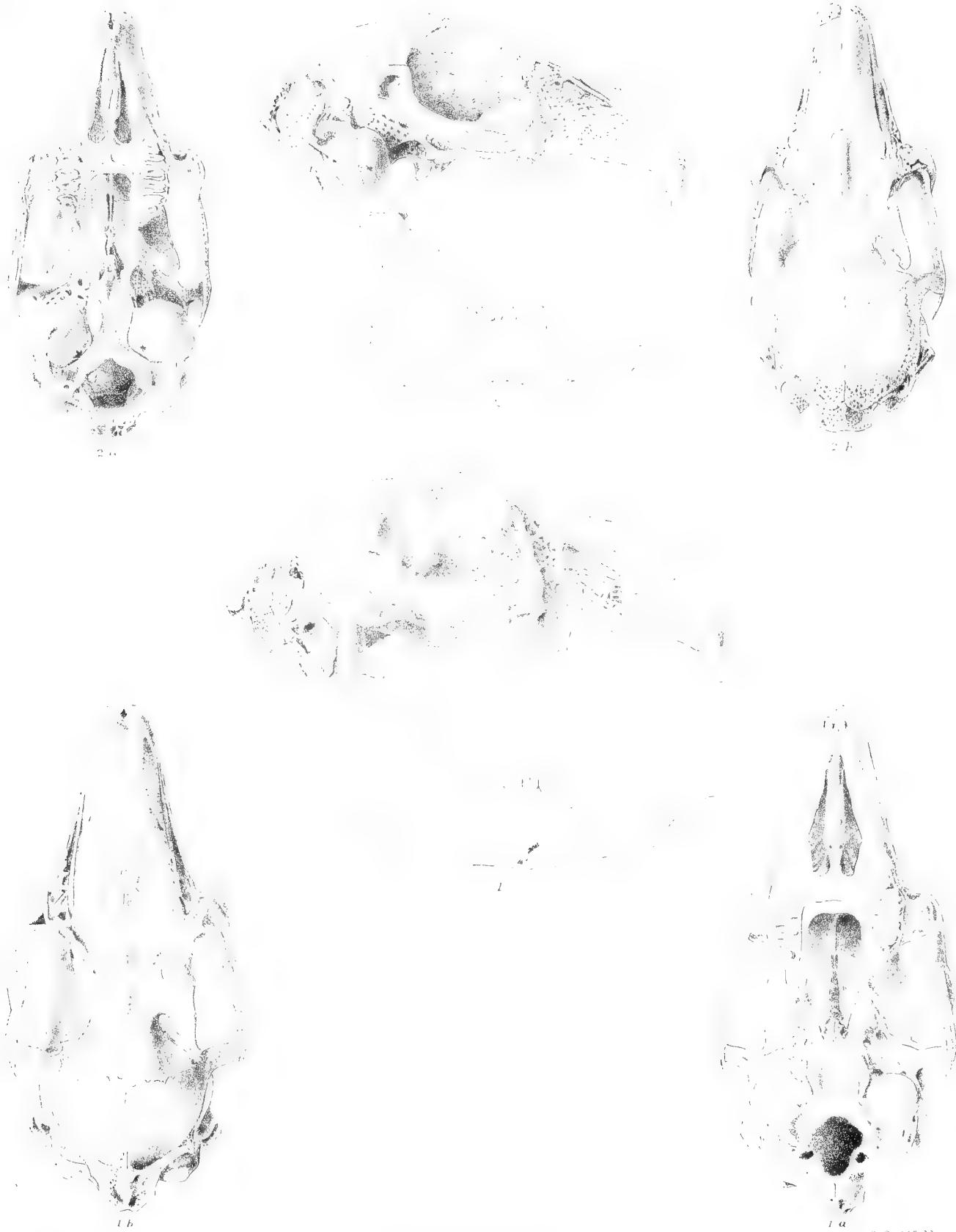
1, LEPUS YARKANDENSIS.

Martens Bros. imp.

2, LEPUS TIBETANUS.



Plate IVa.



J. Schaumburg Lith.

1. *LEPUS HYPSIUS*.  
2. *LEPUS YARKANDENSIS*.

S. Sedgfield imp.

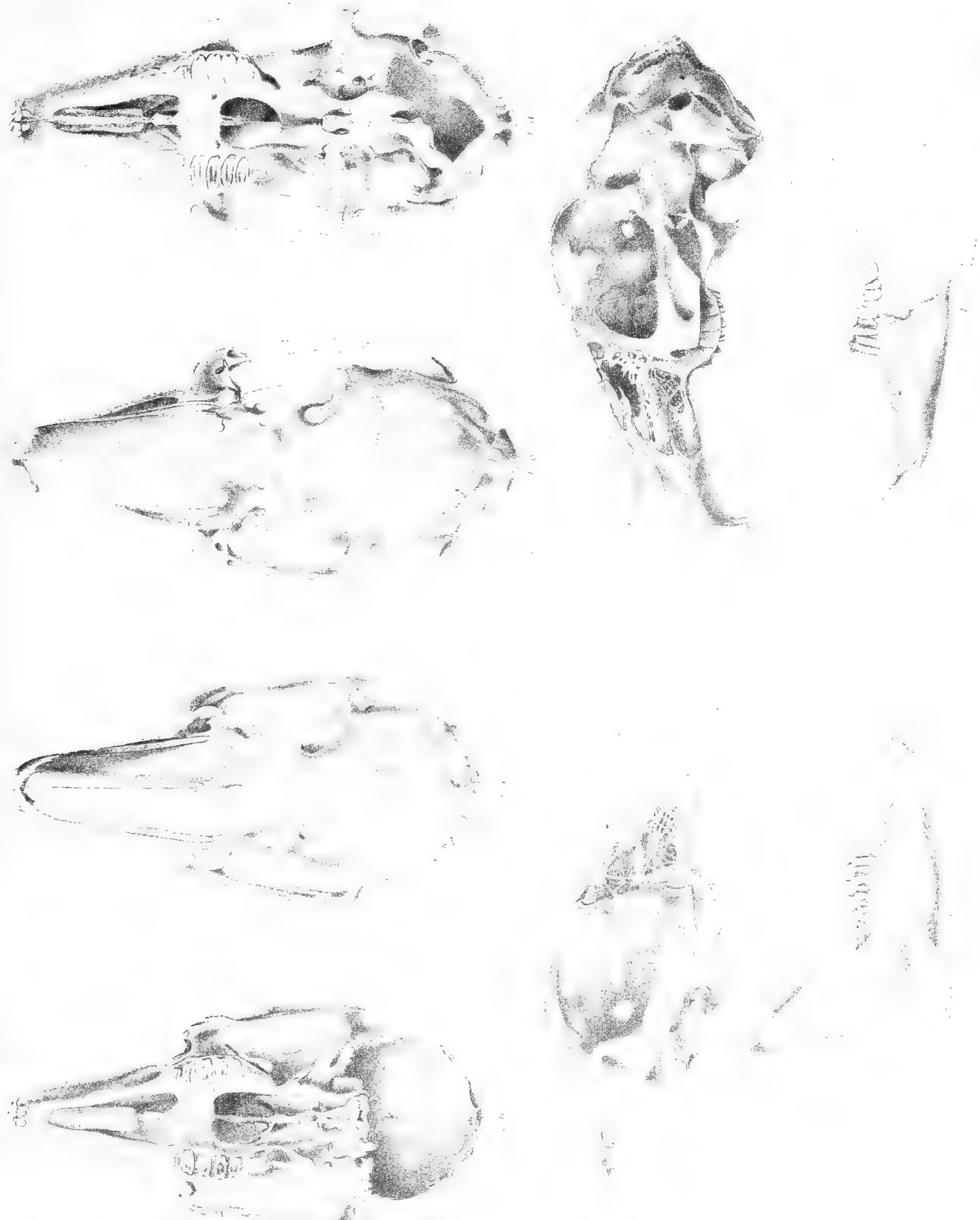




U. Neumanns

1. LEPUS PAMIRENSIS  
2. " STOLICCIANUS





I. LEPUS PAMIRENSIS  
SPP. C. K. A. 11.





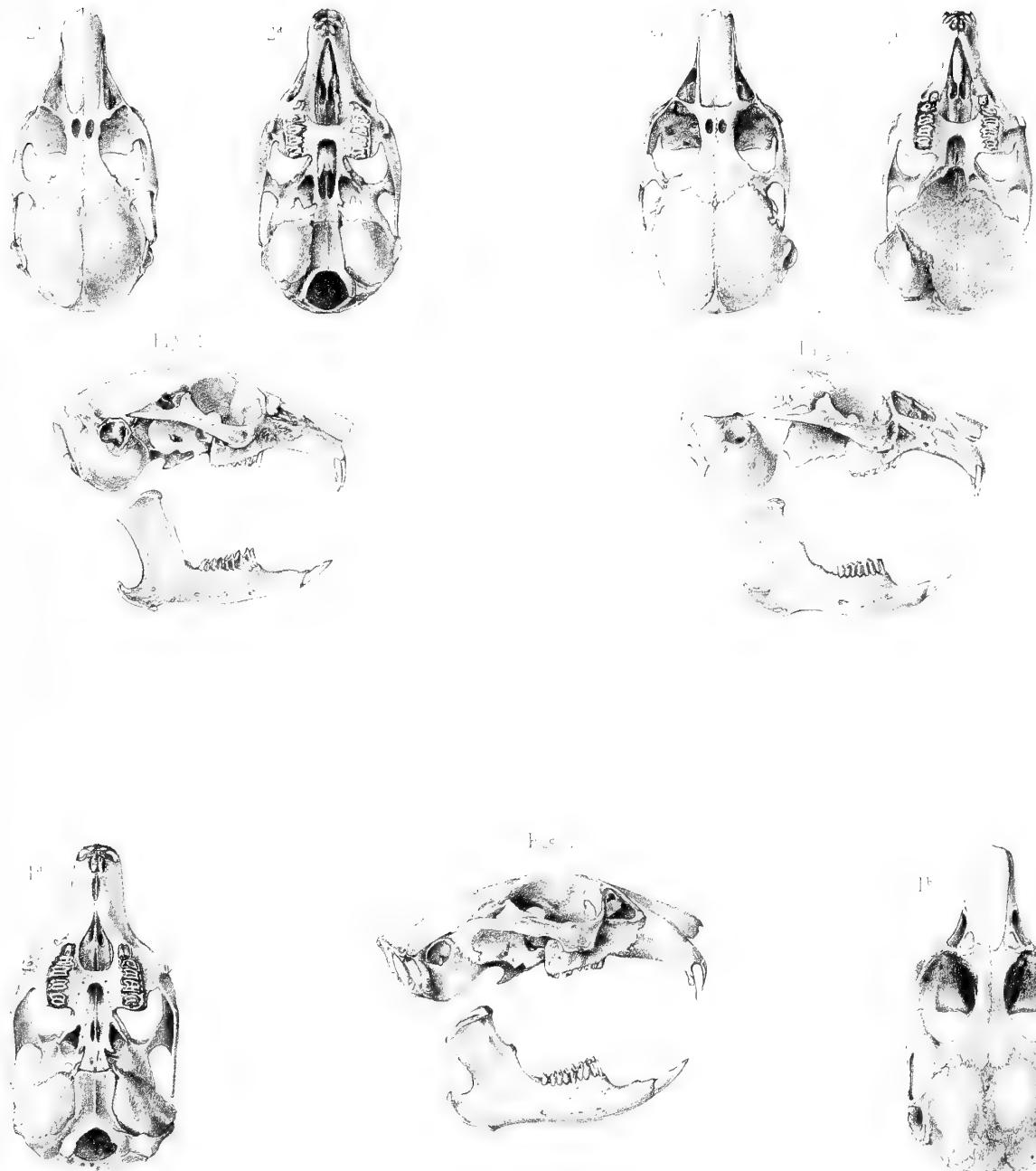




J. G. Keulemans del.

1. *LAGOMYS GRISEUS*  
2. *L. LADACENSIS*





Kuhtüde Amed del

1. *LAGOMYS LADACENSIS*

Macfie & Macdonald Lith

2. " *AURITUS*.

3. " *GRISEUS*





J. G. Keulemans.

1. *APVICOLA STOLICZKANUS.*  
2. *APVICOLA BLYTHI.*









Mintern Bros imp

1. CRICETUS FULVUS.  
2. MUS PACHYERCUS.

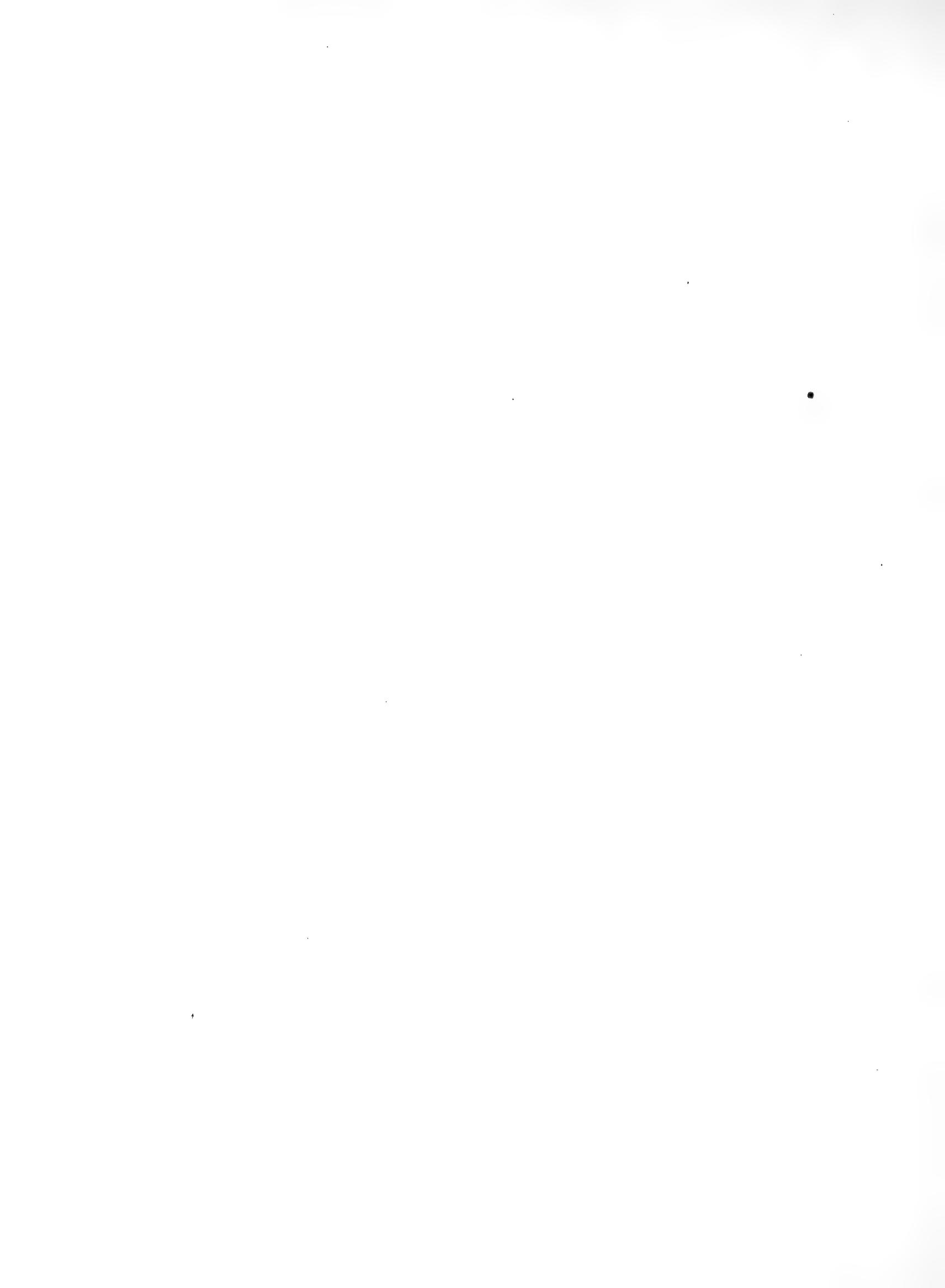


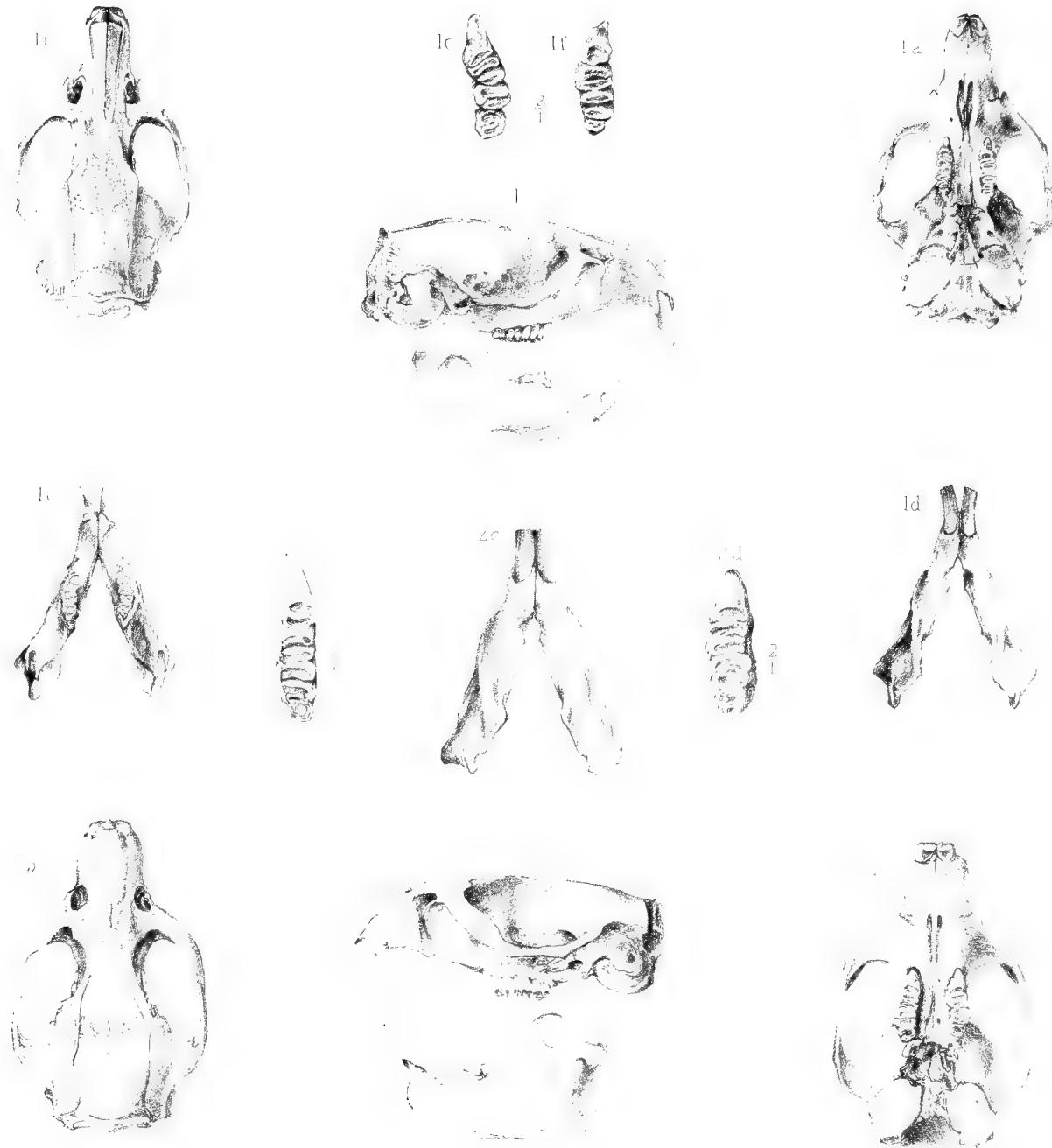


J.G. Keulemans

GERBILLUS CRYPTORHINUS.

Minot's Bird





Bihari Lal Das, del

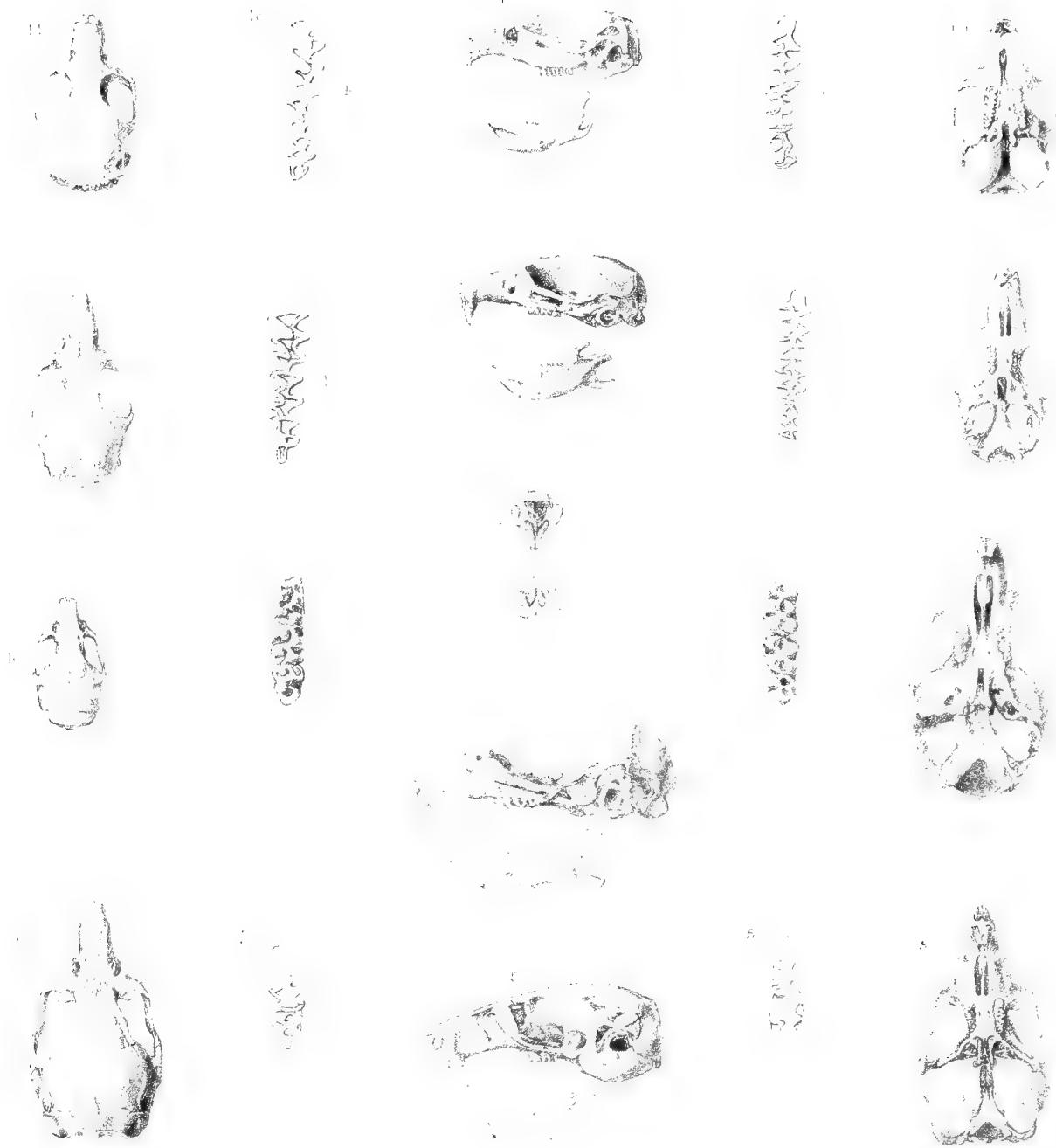
H H Godwin, Austen, lith

Machlin, Macdonald Imp

1. NESOKLA BARCLAYANA.

2. N. (See 1.)





Birds. Part I. [no. 2]

STOMATELLUS — *4* *5* *6* *7* *8* *9* *10* *11* *12* *13* *14* *15* *16* *17* *18*  
CEPHALUS — *1* *2* *3* *19* *20* *21* *22* *23* *24* *25* *26* *27* *28* *29* *30* *31* *32* *33* *34* *35* *36* *37* *38* *39* *40* *41* *42* *43* *44* *45* *46* *47* *48* *49* *50* *51* *52* *53* *54* *55* *56* *57* *58* *59* *60* *61* *62* *63* *64* *65* *66* *67* *68* *69* *70* *71* *72* *73* *74* *75* *76* *77* *78* *79* *80* *81* *82* *83* *84* *85* *86* *87* *88* *89* *90* *91* *92* *93* *94* *95* *96* *97* *98* *99* *100* *101* *102* *103* *104* *105* *106* *107* *108* *109* *110* *111* *112* *113* *114* *115* *116* *117* *118* *119* *120* *121* *122* *123* *124* *125* *126* *127* *128* *129* *130* *131* *132* *133* *134* *135* *136* *137* *138* *139* *140* *141* *142* *143* *144* *145* *146* *147* *148* *149* *150* *151* *152* *153* *154* *155* *156* *157* *158* *159* *160* *161* *162* *163* *164* *165* *166* *167* *168* *169* *170* *171* *172* *173* *174* *175* *176* *177* *178* *179* *180* *181* *182* *183* *184* *185* *186* *187* *188* *189* *190* *191* *192* *193* *194* *195* *196* *197* *198* *199* *200* *201* *202* *203* *204* *205* *206* *207* *208* *209* *210* *211* *212* *213* *214* *215* *216* *217* *218* *219* *220* *221* *222* *223* *224* *225* *226* *227* *228* *229* *230* *231* *232* *233* *234* *235* *236* *237* *238* *239* *240* *241* *242* *243* *244* *245* *246* *247* *248* *249* *250* *251* *252* *253* *254* *255* *256* *257* *258* *259* *260* *261* *262* *263* *264* *265* *266* *267* *268* *269* *270* *271* *272* *273* *274* *275* *276* *277* *278* *279* *280* *281* *282* *283* *284* *285* *286* *287* *288* *289* *290* *291* *292* *293* *294* *295* *296* *297* *298* *299* *300* *301* *302* *303* *304* *305* *306* *307* *308* *309* *310* *311* *312* *313* *314* *315* *316* *317* *318* *319* *320* *321* *322* *323* *324* *325* *326* *327* *328* *329* *330* *331* *332* *333* *334* *335* *336* *337* *338* *339* *340* *341* *342* *343* *344* *345* *346* *347* *348* *349* *350* *351* *352* *353* *354* *355* *356* *357* *358* *359* *360* *361* *362* *363* *364* *365* *366* *367* *368* *369* *370* *371* *372* *373* *374* *375* *376* *377* *378* *379* *380* *381* *382* *383* *384* *385* *386* *387* *388* *389* *390* *391* *392* *393* *394* *395* *396* *397* *398* *399* *400* *401* *402* *403* *404* *405* *406* *407* *408* *409* *410* *411* *412* *413* *414* *415* *416* *417* *418* *419* *420* *421* *422* *423* *424* *425* *426* *427* *428* *429* *430* *431* *432* *433* *434* *435* *436* *437* *438* *439* *440* *441* *442* *443* *444* *445* *446* *447* *448* *449* *450* *451* *452* *453* *454* *455* *456* *457* *458* *459* *460* *461* *462* *463* *464* *465* *466* *467* *468* *469* *470* *471* *472* *473* *474* *475* *476* *477* *478* *479* *480* *481* *482* *483* *484* *485* *486* *487* *488* *489* *490* *491* *492* *493* *494* *495* *496* *497* *498* *499* *500* *501* *502* *503* *504* *505* *506* *507* *508* *509* *510* *511* *512* *513* *514* *515* *516* *517* *518* *519* *520* *521* *522* *523* *524* *525* *526* *527* *528* *529* *530* *531* *532* *533* *534* *535* *536* *537* *538* *539* *540* *541* *542* *543* *544* *545* *546* *547* *548* *549* *550* *551* *552* *553* *554* *555* *556* *557* *558* *559* *560* *561* *562* *563* *564* *565* *566* *567* *568* *569* *570* *571* *572* *573* *574* *575* *576* *577* *578* *579* *580* *581* *582* *583* *584* *585* *586* *587* *588* *589* *590* *591* *592* *593* *594* *595* *596* *597* *598* *599* *600* *601* *602* *603* *604* *605* *606* *607* *608* *609* *610* *611* *612* *613* *614* *615* *616* *617* *618* *619* *620* *621* *622* *623* *624* *625* *626* *627* *628* *629* *630* *631* *632* *633* *634* *635* *636* *637* *638* *639* *640* *641* *642* *643* *644* *645* *646* *647* *648* *649* *650* *651* *652* *653* *654* *655* *656* *657* *658* *659* *660* *661* *662* *663* *664* *665* *666* *667* *668* *669* *670* *671* *672* *673* *674* *675* *676* *677* *678* *679* *680* *681* *682* *683* *684* *685* *686* *687* *688* *689* *690* *691* *692* *693* *694* *695* *696* *697* *698* *699* *700* *701* *702* *703* *704* *705* *706* *707* *708* *709* *710* *711* *712* *713* *714* *715* *716* *717* *718* *719* *720* *721* *722* *723* *724* *725* *726* *727* *728* *729* *730* *731* *732* *733* *734* *735* *736* *737* *738* *739* *740* *741* *742* *743* *744* *745* *746* *747* *748* *749* *750* *751* *752* *753* *754* *755* *756* *757* *758* *759* *760* *761* *762* *763* *764* *765* *766* *767* *768* *769* *770* *771* *772* *773* *774* *775* *776* *777* *778* *779* *780* *781* *782* *783* *784* *785* *786* *787* *788* *789* *790* *791* *792* *793* *794* *795* *796* *797* *798* *799* *800* *801* *802* *803* *804* *805* *806* *807* *808* *809* *810* *811* *812* *813* *814* *815* *816* *817* *818* *819* *820* *821* *822* *823* *824* *825* *826* *827* *828* *829* *830* *831* *832* *833* *834* *835* *836* *837* *838* *839* *840* *841* *842* *843* *844* *845* *846* *847* *848* *849* *850* *851* *852* *853* *854* *855* *856* *857* *858* *859* *860* *861* *862* *863* *864* *865* *866* *867* *868* *869* *870* *871* *872* *873* *874* *875* *876* *877* *878* *879* *880* *881* *882* *883* *884* *885* *886* *887* *888* *889* *890* *891* *892* *893* *894* *895* *896* *897* *898* *899* *900* *901* *902* *903* *904* *905* *906* *907* *908* *909* *910* *911* *912* *913* *914* *915* *916* *917* *918* *919* *920* *921* *922* *923* *924* *925* *926* *927* *928* *929* *930* *931* *932* *933* *934* *935* *936* *937* *938* *939* *940* *941* *942* *943* *944* *945* *946* *947* *948* *949* *950* *951* *952* *953* *954* *955* *956* *957* *958* *959* *960* *961* *962* *963* *964* *965* *966* *967* *968* *969* *970* *971* *972* *973* *974* *975* *976* *977* *978* *979* *980* *981* *982* *983* *984* *985* *986* *987* *988* *989* *990* *991* *992* *993* *994* *995* *996* *997* *998* *999* *1000*



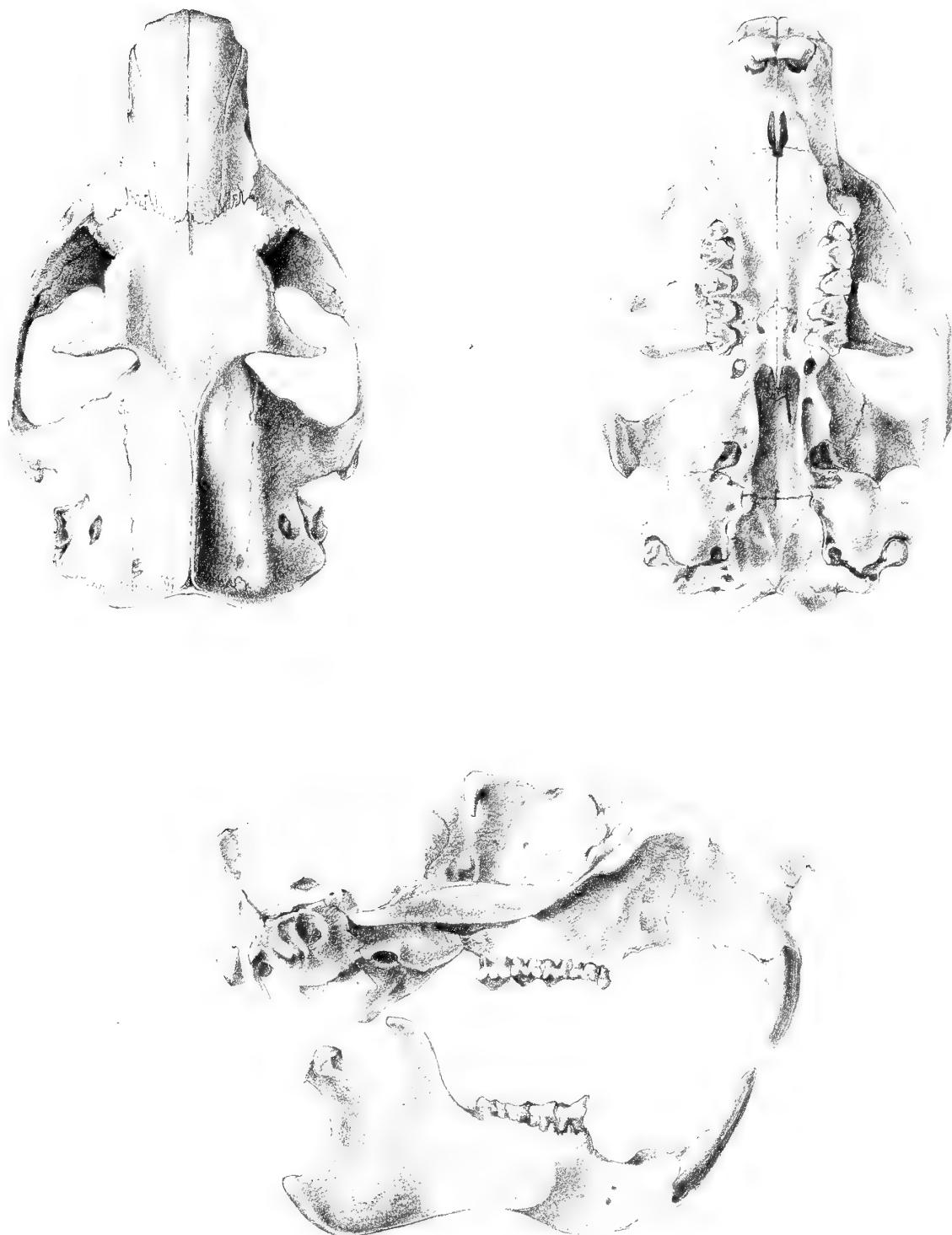


Smith del et lith.

ARCTOMYS AUREUS

Mintern Bros. imp

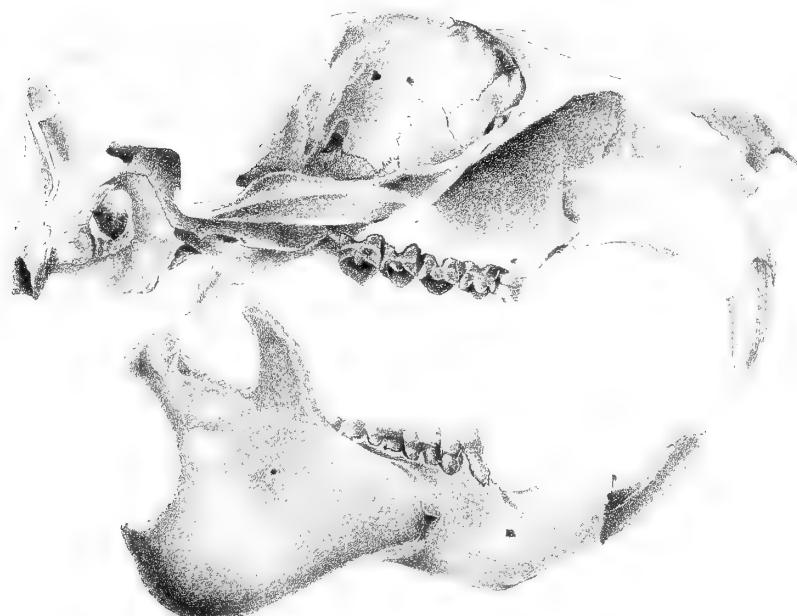
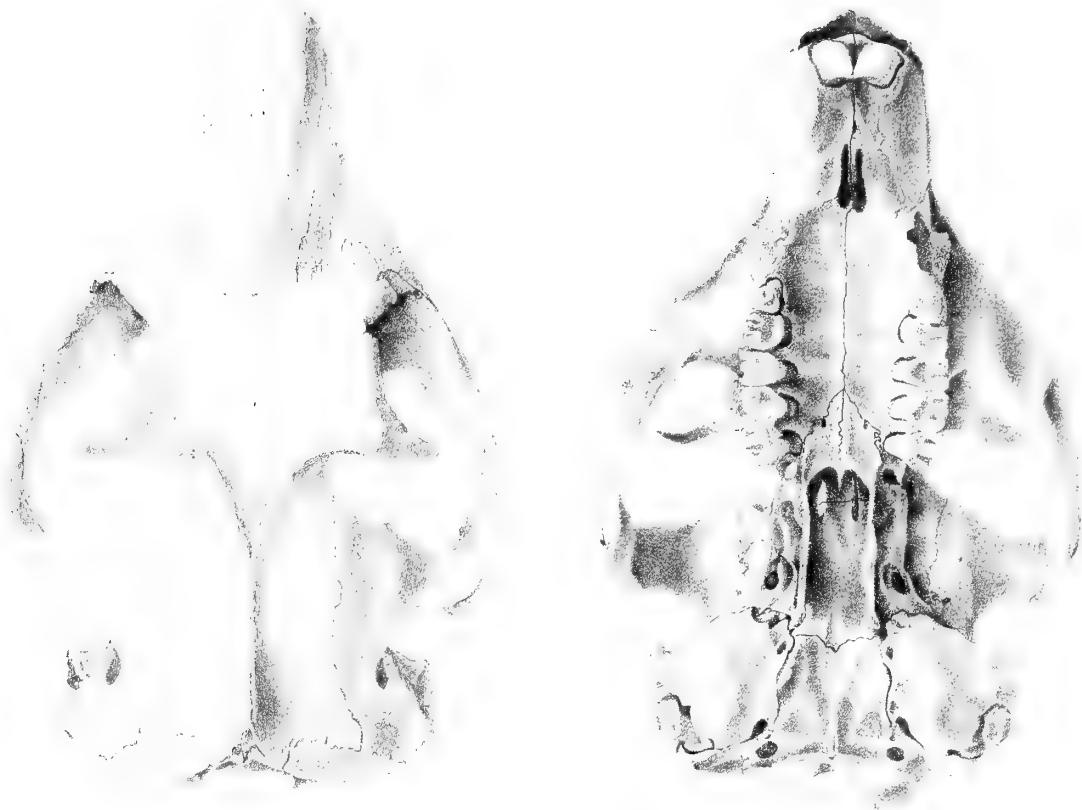












Behari Lal Das, del

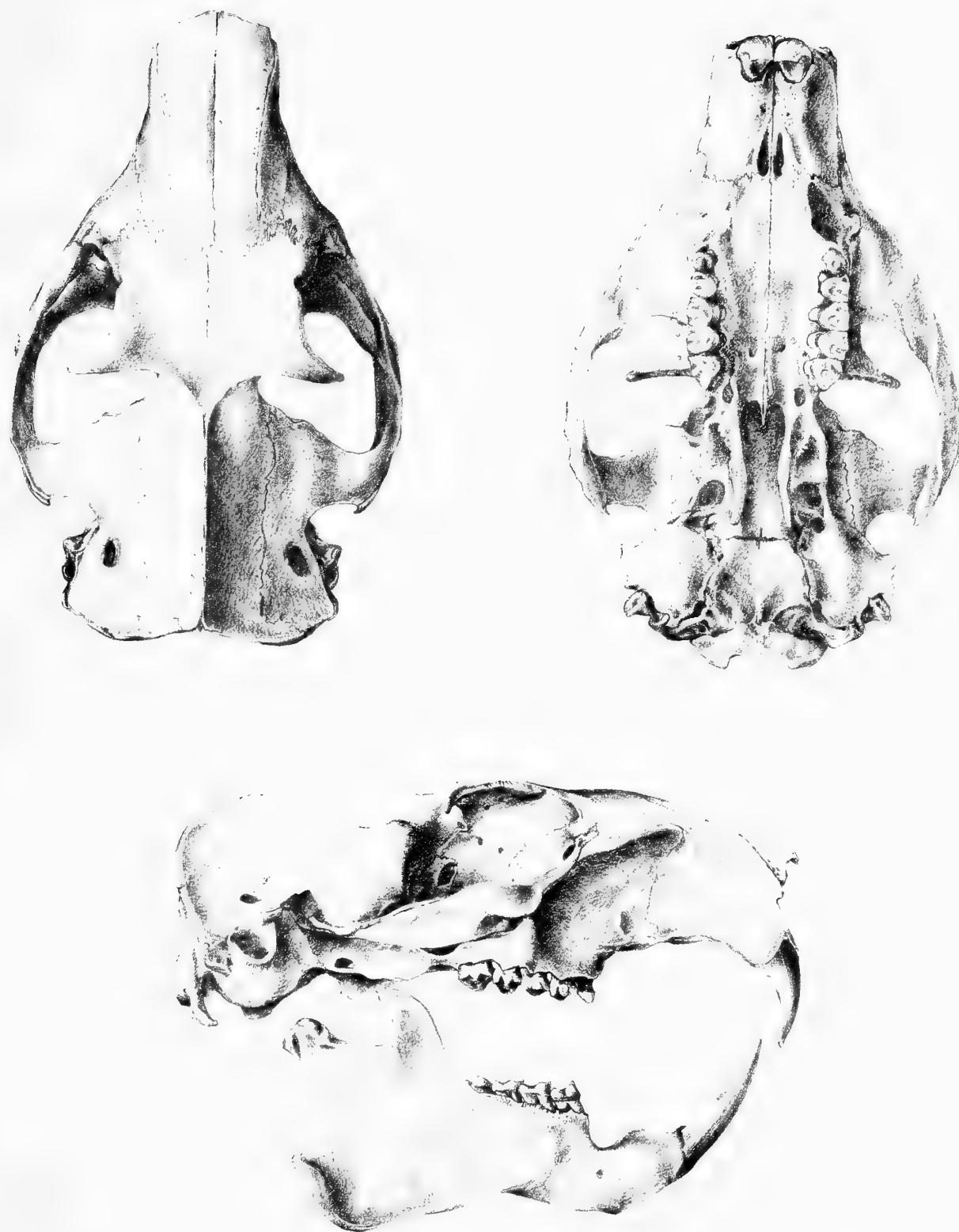
Macfie & Macdonald, 1910

ARCTOMYS HIMALAYANUS









Behari Lal Das, del.  
H. H. Godwin Austin, lith.

Macfie & Macdonald, imp.

ARCTOMYS CAUDATUS



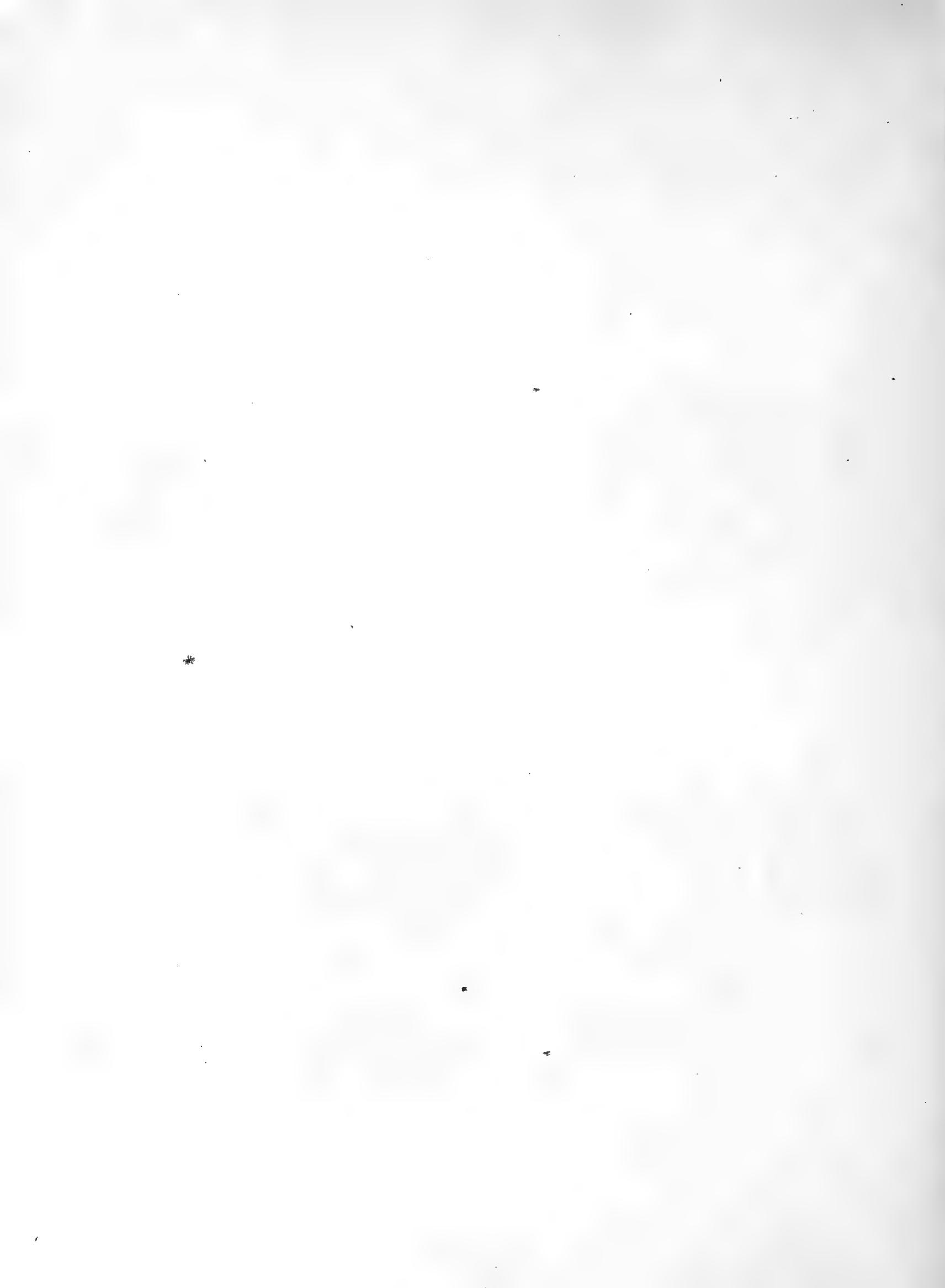


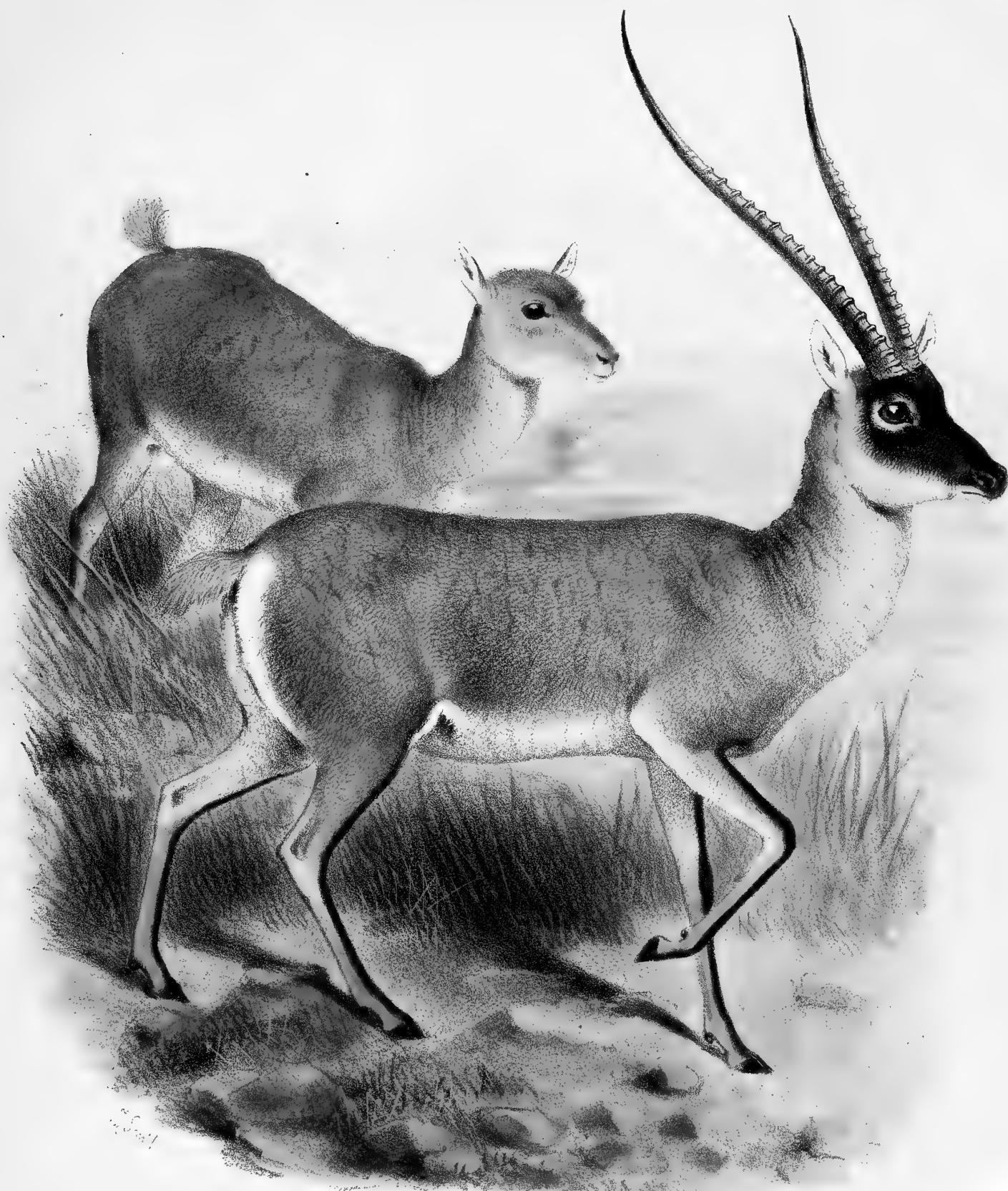




GAZELLA SUBGUTTUROSA, var. YARKANDENSIS, ♂ & ♀.

Mintern Bros. imp.





J. Smit del.

PANTHOLOPS HODGSONI, ♂ & ♀.













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